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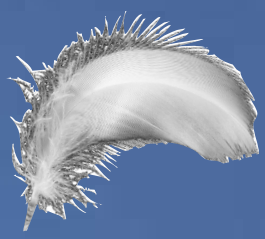


# LIGHT

## LIGHTER, MORE COMPACT EQUIPMENT

### TESTS

Softlinks
Nevures' Whizz
Neo's String
Kortel Kruyer 2
Woody Valley's Wani
The sky's the limit: lightweight paramotoring.
Monopeaux with motor

### MATERIAL

Actus
Dyneema
Titanium

SUMMARY



# LIGHT

Lightweight equipment is flying out of the door, in both paragliding and paramotoring. It adds a whole new dimension to our sport in paragliding, hike and fly, and in paramotoring vol bivouac. But for everyday flying, it has also given us wings that behave better and motors which take-off more easily. This article is the first in a series focusing on tests and reviews of lightweight and compact products, so keep watching, for more information on the subject.

*By Sascha Burkhardt*
*Translation by Ruth Jessop*

In the lightweight market you find little known manufacturers like the Slovenian company Kimfly, who specialise in this growing niche market. Pictured opposite: A Nuptse taking off.
**www.kimfly.si**

# PORTFOLIO

*Photos: Markus Gründhammer / www.skyman.aero*

## A DAWN TAKEOFF.

Skyman's Markus Gründhammer, has become a total fan of flying light and hike and fly. Every time that the weather and his work schedule as a designer allows, this former acro pilot disappears off into the mountains with his wing on his back and his camera over his shoulder.

This autumn, he and some friends climbed Habicht (3,300 m) in the Stubaï Valley.

Photo: Sascha Burkhardt

Markus Gründhammer: Beauty and his Beast…

They slept on the summit so that they were able to take off before sun rise.

It was in the first rays of morning sunlight that they glided gently towards the valley, in oily calm air…

A magical moment thanks to travelling light, a far cry from formal take-offs beside gondola stations. Another way to enjoy our sport. How fantastic!!
http://www.skyman.aero

### THE ADVANCE LIGHTNESS 2 IS NOW AVAILABLE

The new XC lightweight harness, the Lightness 2, which the Swiss manufacturer launched at the Coupe Icare, is now on the market, available in three sizes. The price includes its own rucksack the Lightpack 2 and the lightweight Compressbag: 1,390 euros.
http://www.advance.ch/en/products/harnesses/lightness-2/



### SUPAIR

The Delight 2 from Supair launched for the first time at the Coupe Icare, is also now available. It has a 15 cm thick Bump'air protector as well as leg straps with the 'Safe-T' system (so that you can't forget to do them up) and Anti-Balance System. The Delight 2 will be even more versatile than the Delight thanks to new geometry and its removable mini seat plate, which allows efficient piloting with good feedback about the air.
http://www.supair.com

Photo: Loren Oxx/Ozone Photo- Eric Leblanc

## OZONE'S SWIFT 4: A LIGHTWEIGHT VERSION OF THE RUSH 4

The Swift 4 from Ozone is the all new light weight version of the Rush 4. In size MS the manufacturer saved 300 grams: The MS Rush 4 weighed 5.5 kg, the MS Swift 4 weighs 4.19 kg.
The geometry and the profile remain identical. The saving in weight comes from manufacturing optimization along the same lines as the LM5, UL3 and Geo 4, and the use of light and ultra light material. Amongst other things, they use Porcher Skytex 27 and softlinks instead of maillons.
The Swift 4, which has a SharkNose and includes some of the characteristics of the Delta 2/Alpina 2, is an EN B which slots in between the Geo 4 and the Alpina 2, in Ozone's range.
http://www.flyozone.com/paragliders/en/products/gliders/swift-4/info/

Photo: Skywalk

## SKYWALK'S ARRIBA3 HAS ARRIVED.

At Skywalk, the all new Arriba3 (LTF/EN B) is a lightweight version of the Tequila4, a wing which is considered to be at the lower end of the EN B category. The manufacturer is said to have saved 1,100 grammes compared to the Tequila in size M (all up weight 85-115 kg, 100 kg recommended). A kilo which will make taking off easier and considerably reduce the volume of the wing. In addition, optimising the lines will assure performance and reduce the drag.
www.skywalk.org


Katadyn Hiker Pro


Katadyn Mini

## KATADYN : DRINKING ON VOL BIVOUAC

Pilots who like hike and fly, and especially vol bivouc, are often concerned about drinking water obviously very heavy to carry or to find on site. In some places, it isn't easy to find clean water. To ensure that you don't have to shorten a flight due to severe diarrhoea, you can filter the water with a filter/pump unit from Katadyn: the most recent models are getting lighter and lighter and are compatible with our harnesses. The Katadyn Mini (ceramic filter) weighs only 210 grammes, has a filter capacity of approximately 7000 litres and costs 125 €. The Hiker Pro costs about 90 € and its filter capacity (glass fibre) is 1150 litres according to the manufacturer.
http://www.katadyn.com/en

A beautiful, wild mountain take-off is the reward after a long walk-in taking several hours, or even a few days.

Photo: Jérôme Maupoint/GIN

Photo: Michel Farrugia

## THE TREKKING TREK

The new Trek from Trekking is the lightest wing in the Senso range. With a weight of 4.2 kg, the Trek M is 500 grammes lighter than the Senso Sport M and 1.5 kg lighter than the classic Senso. The reduction in weight comes from an even more radical use of lightweight material (Skytex 27-36) and by making the risers from Dyneema.
In addition, it isn't assembled in exactly the same way as the Senso.
http://trekking-parapentes.fr


THE SWING CONNECT REVERSE EVO

A reversible harness well suited to hike and fly in the 4 to 5 kg weight range. The Swing Connect Reverse Evo differs from the others due to its carrying system designed by the rucksack specialist Deuter. The harness is made by Woody Valley for Swing. Price: 830 euros. There will be a full flight test in free.aero in the spring…
http://www.swing.de/connect-reverse-evo-en.html

NIVIUK KONVERS

The Konvers is also a comfortable reversible harness in the 4 to 5 kg weight range, designed for hike and fly. It is designed and made entirely by Niviuk. On the left, a close up in 'rucksack mode' showing the 'padded comfort layer', identical to that in the back of the harness when flying. The seat of the harness is very thick. The foot strap is standard. Price 793 euros

There will be a full flight test in free.aero in the spring…www.niviuk.com


STRONG AND THIN

# Dyneema

The miracle material Dyneema is taking over more and more, not only in our lines, but also as an essential component in harnesses and connectors.

The String by Neo (www.flyneo.com). The pilot's weight is almost exclusively supported by straps, indeed rather thin looking straps, made from Dyneema.

Photo: Véronique Burkhardt - Pilote Sascha Burkhardt

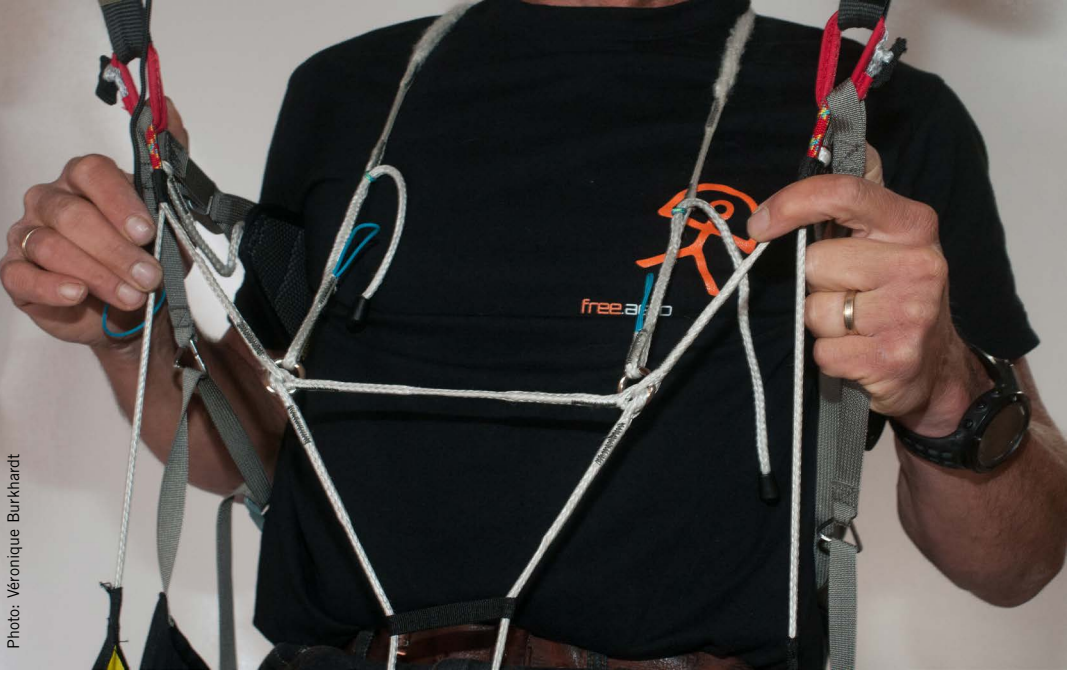


Photo: Véronique Burkhardt

The pilot quickly learns to have confidence in these 3 mm 'strings' by Dynalight. Their nominal breaking resistance is 1,100kg. After being spliced that drops to 900 daN. More than enough!

Photo: Kortel Design

The Kruger II from Kortel Design. Kortel were one of the first harness manufacturers to launch ultra light, minimalist harnesses.

Dyneema is a very resistant fibre based on polythene with a very high molecular mass, called "Ultra-High-Molecular-Weight Polyethylene". The chains of UHMPE are very long and orientate themselves in a parallel manner. Their tensile strength is about 40% higher than that of an Aramid fibre, and 60% higher than that of a carbon fibre. Dyneema fibre is made by the Dutch company DSM who deliver it to cloth or cord manufacturers like Cousin and Edelrid. That's why competing companies can all offer 'Dyneema lines', even though it is a registered name. These manufacturers must provide DSM with the finished product so that it can be stamped with this prestigious name, synonymous with unparalleled resistance in the many domains where it is used: bullet proof vests, cut resistant gloves and trousers for use with chainsaws, nets and cables used for professional fishing or in industry to replace steel ropes.

## DYNEEMA LINES

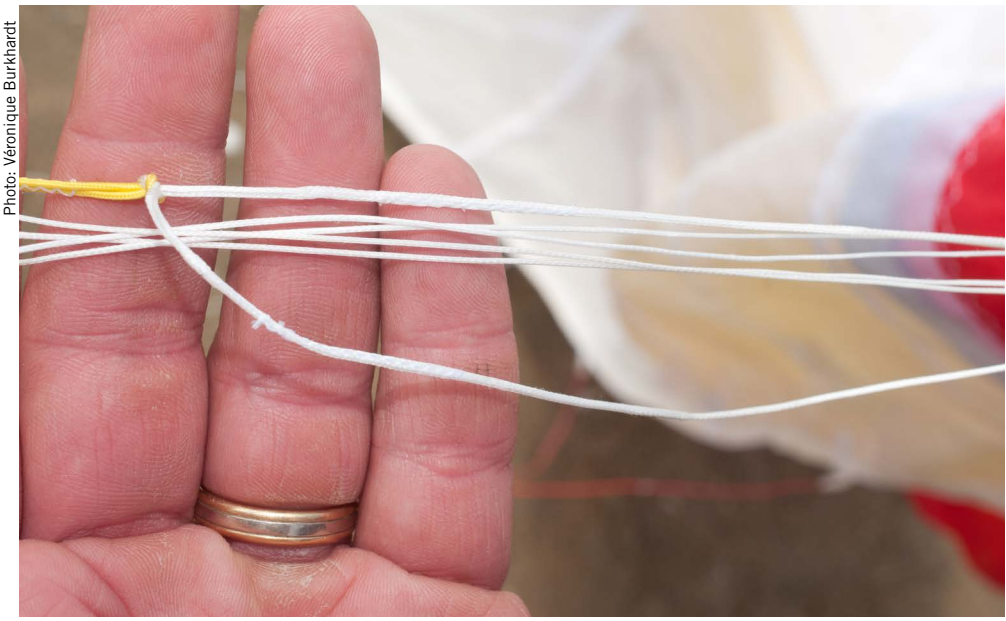
The advantages of Dyneema for use in the lines:
+ very high tensile strength
+ low elasticity
+ water resistant
+ UV resistant
+ resistant to the majority of corrosive chemicals.

The disadvantages:
- less resistant to high temperatures
- dimensional instability: it becomes shorter with age

Manufacturers who use Dyneema, often do so in the short top part of the lines, where the eventual shortening of the lines will only cause a slight variation in the trim.

Its high strength combined with its light weight aren't Dyneema's only assets. It is also very resistant to abrasion, up to fifteen times more than steel for example. The fibre behaves as if it is self lubricating. Put more simply, you could say that it is so smooth that it doesn't offer any angle of attack to abrasive objects. By sliding a Dyneema line between your fingers, it feels as if it is coated in oil. Its co-efficient of friction is comparable to Teflon (the non-stick layer on pans...). In addition, Dyneema is very resistant to shocks, to chemicals and to water.

Photo: Véronique Burkhardt



We are very familiar with Dyneema being used in the lines, as in this Gradient wing.

One of the first flexible connectors for paragliding: Bertrand Maddalena, then owner of Ripair, designed it twelve years ago. Most paraglider pilots were fairly sceptical. However, this connector only weighs 12 grammes, and has a breaking resistance of 2.2 t. It is more resistant than a typical aluminium karabiner (about 1.6-1.8 t for 70 grammes) and just as resistant as a stainless steel karabiner (130 grammes, 2.2 t).

An alternative: This light weight aluminium karabiner. Grivel, its manufacturer, claims an astonishing breaking resistance of 2.2 t for a weight of 37 grammes. It's great, but still three times heavier than the softlink on the left.

Photos: Sascha Burkhardt

## IN PRACTICE

Lots of pilots remain sceptical after examining the Dyneema straps or cords which are used to make the ultralight harnesses. However after trying to cut the fibres with a serrated knife, you can see that actually, it takes a lot to destroy a significant number of the fibres; there is a big margin.

If you open and close a softlink a lot, it ends up fraying a bit, but that only affects a few isolated fibres.
Its good resistance to abrasion is also the reason why softlinks can be used to replace maillons without requiring a protective cover. Despite their best efforts, the lines won't cut through the Dyneema fibres.

Photo: François Blazquez/Cousin-Trestec

Dyneema cord being made at Cousin-Trestec. This manufacturer uses Dyneema fibre from the Dutch company DSM, owner of the Dyneema name. The threads are woven and coated according to requirements.

A close up of a plait used by Kortel Design. The thin dyneema fibres which make up the cord are clearly visible. The black coating colours and protects the fibres. It's also for aesthetic purposes: When in use, the inevitable small marks show up less on grey cord than on white.

Photo: Sascha Burkhardt

Photo: Sascha Burkhardt


Photo: Sascha Burkhardt

In 2004, on the enormous catamaran owned and skippered by former paraglider pilot, Yves Parlier, it was already possible to appreciate the resistance of Dyneema fibre. It replaced, and was an improvement on, the steel shrouds and shackles which were a lot heavier.

At the time, it was still pretty unusual. Today, all the ship's chandlers sell dyneema softlinks, or similar, to the most amateur of sailors.

For example these Wichard links advertised via www.accastillage-diffusion.com, with a practical stainless steel fastening. Breaking strength 2600 kg for the 3 mm version, price 14.90 euros.

Softlinks are even used to link reserves to harnesses. Knowing that Dyneema has very little heat resistance (one of its few weak points), you would think that the shock of the opening and the heating with it, would be fatal for them. But evidently, even parachutists use these textile links instead of ironmongery.

Indeed, free fallers were the first ones to use Dyneema softlinks. Paraglider pilots waited a lot longer. In 2003 Bertrand Maddalena designed the first softlinks for Supair. It was only a decade later that they became part of our way of life. After a long period when Dyneema was only used for the lines, manufacturers like Skyman started to systematically replace maillons. Ozone, for example, also did it for the Swift 4 to save a few more grammes.

However, even aluminium karabiners don't appear to be infallible. Ten years ago, some Austrialpin karabiners broke prematurely due to fissures which were invisible to the naked eye.

More recently, the company recalled their Delta steel karabiners because in certain cases, their breaking resistance could drop significantly.

A close up of a Dyneema strap on the Neo String harness.

Photo: Sascha Burkhardt

So there is no reason to automatically have more confidence in metal than in fibre... For sure, it wouldn't be advisable to use an ultralight harness made with Dyneema every day on the Dune de Pyla; just like uncovered Dyneema lines, it would age in the long run. But, after getting to know Dyneema, pilots can enjoy, with peace of mind, the pleasure of hike and fly with a harness that weighs less than a book... ■

We tried to cut one of the cords on a Kortel harness with a table knife and a box cutter…

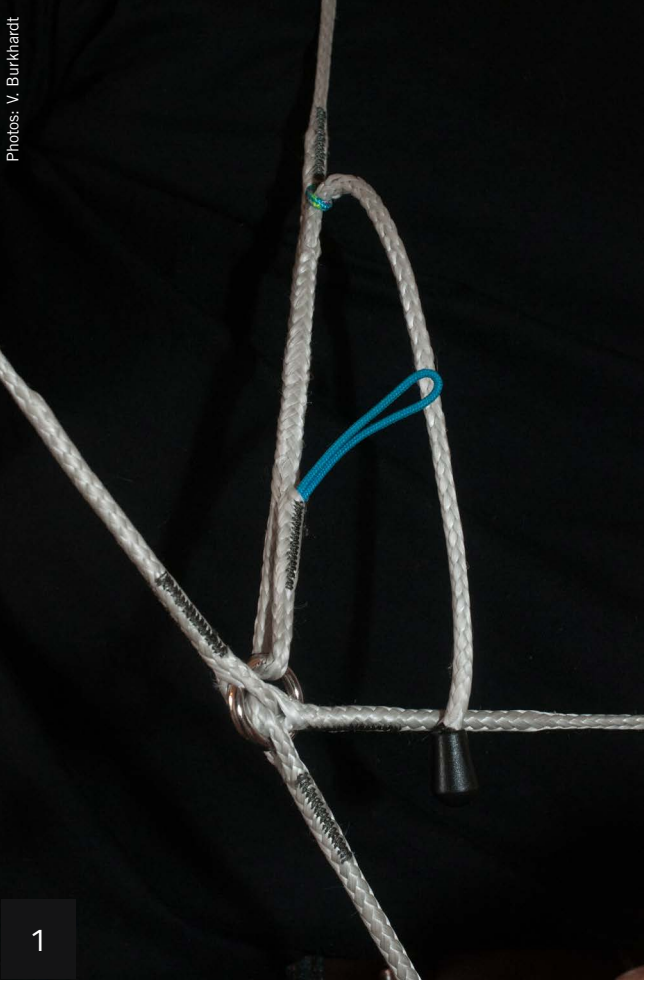
The verdict: The box cutter cut it very quickly and cleanly, on the other hand, the cord showed reassuring resistance against the table knife. It took us quite a while to cut through a significant number of fibres.

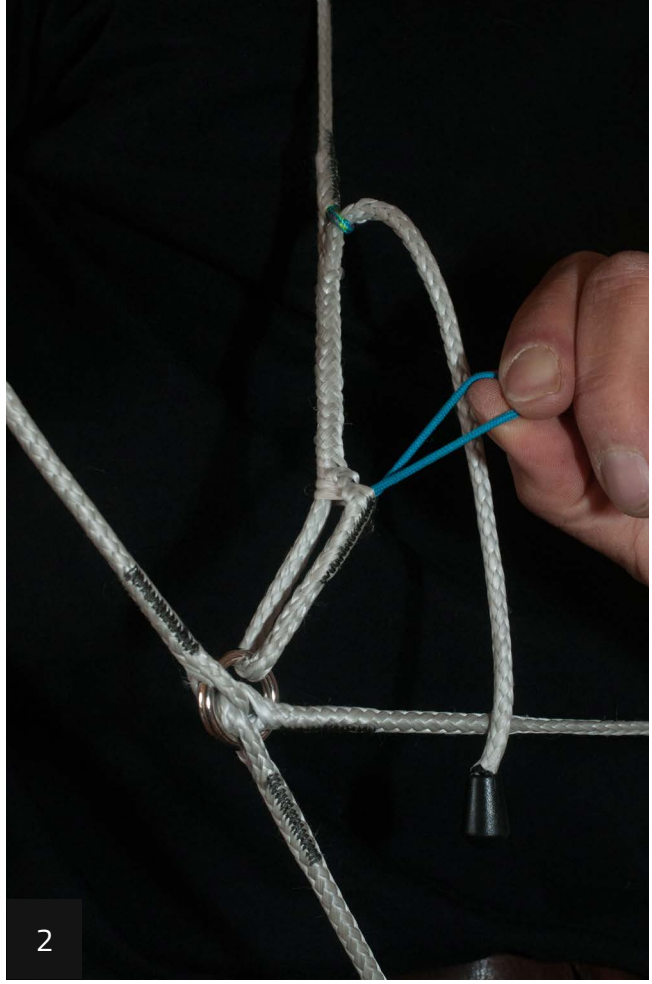
Photos: Sascha Burkhardt

Photo: Skyman

Specialist in mountain wings, Skyman (www.skyman.aero), is systematically replacing the maillons linking the risers and the lines with softlinks.

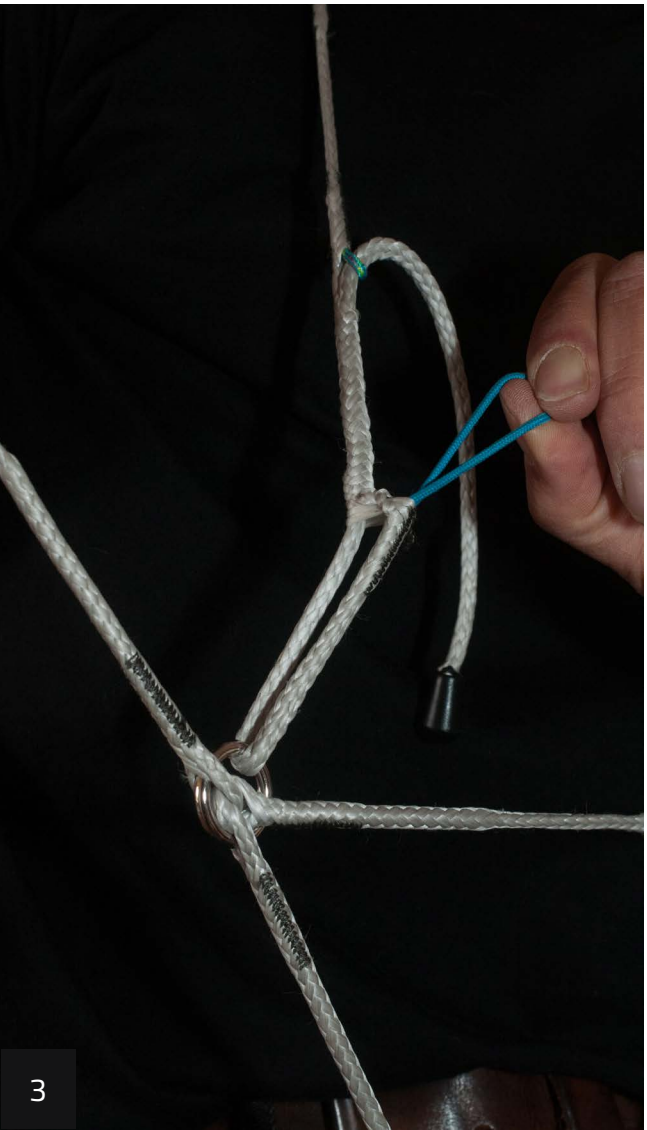
Photos: V. Burkhardt

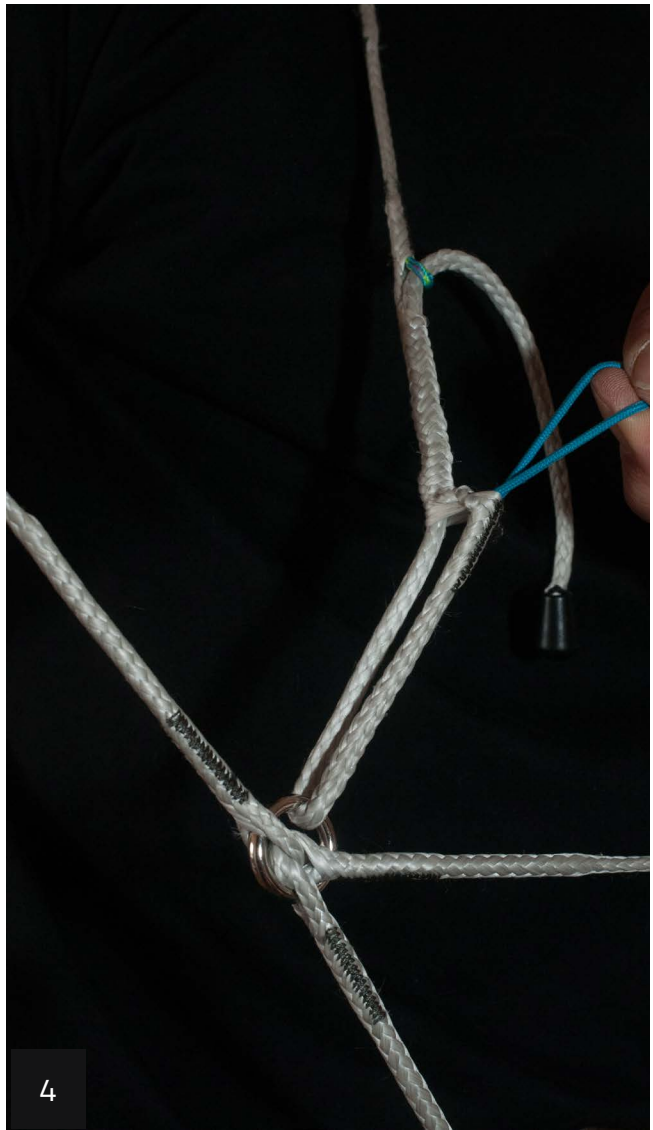


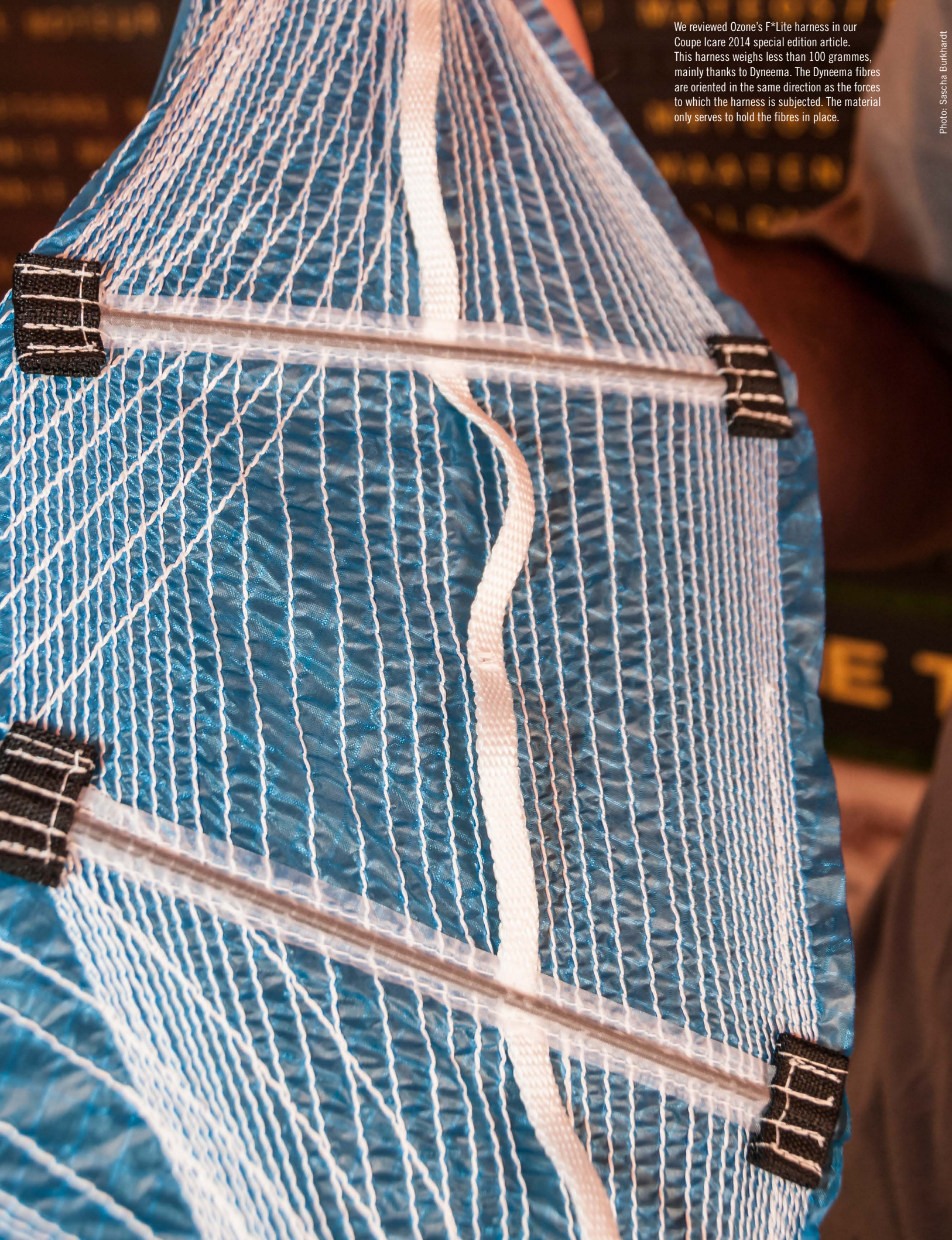




The ingenious adjustment system used on the Kortel harnesses is based on a splice. The cord forms a loop and as it comes back, slides inside itself.

By pulling on the cord, you tighten the adjuster which is then held in place by friction. By pulling on the blue loop (2), the strap is freed and releases itself (3-4).





We reviewed Ozone's F*Lite harness in our Coupe Icare 2014 special edition article. This harness weighs less than 100 grammes, mainly thanks to Dyneema. The Dyneema fibres are oriented in the same direction as the forces to which the harness is subjected. The material only serves to hold the fibres in place.

Photo: Sascha Burkhardt

# SOFTLINKS

## Fabric karabiners

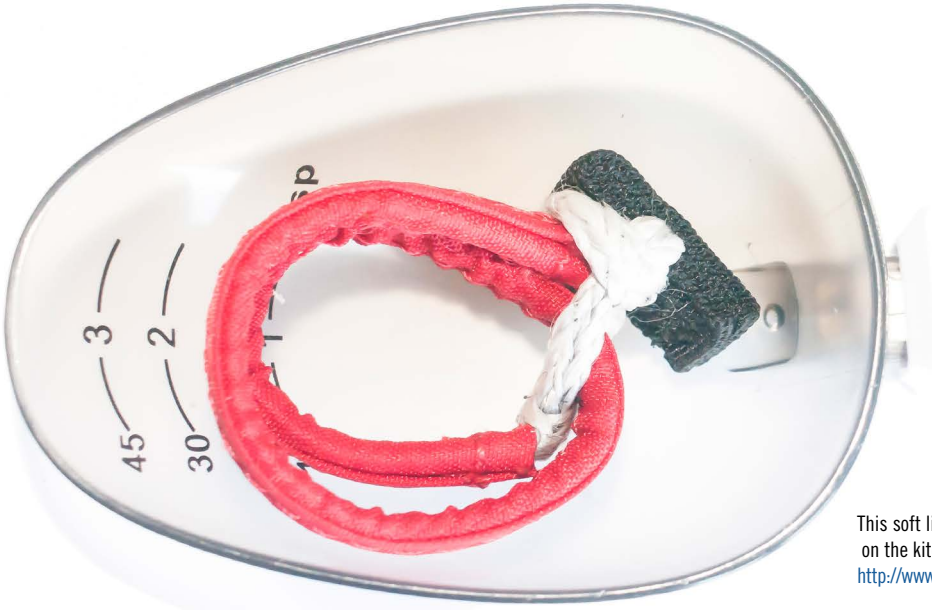




Photo: Sascha Burkhardt

This soft link replacement karabiner by Kortel Design, weighs 5.7 grammes on the kitchen scales. It is more than ten times lighter than an aluminium one… http://www.korteldesign.com/shop/en/

Softlinks are replacing traditional metal karabiners or maillons more and more, but they don't just save a lot of weight. Here's what you need to know to use them correctly…

*Par Sascha Burkhardt*

**FASTEN YOUR KARABINERS…**

Softlinks have a lot of advantages as a replacement for karabiners and maillons. Parachutists use them all the time, even though a few extra grammes doesn't make that much difference for them.

This isn't really that surprising given that, for free fallers, it's reliability that counts!

A fabric loop, once correctly done up, can't come undone all by itself. A maillon, on the other hand, can come undone due to vibration, for example. Obviously, if you are using a good quality, well known maillon, that won't happen; but, evidently, parachutists like the idea that when you do up a softlink you can forget about it and don't need to check it any more.

In paragliding, where softlinks replace traditional maillons, it is still best to check from time to time the condition of the loops, which are often hidden under a neoprene cover.

The replacement of maillons by flexible connectors brings significant advantages with respect to weight, but also a major inconvenience: For pilots who detach the harness from the wing, softlinks are fiddlier and more time consuming. For some very narrow softlinks like the ones from Kortel, it's possibly prohibitive. Interestingly, in a pair of softlinks from this manufacturer, one of the two had a loop which was slightly smaller; it was a lot more difficult to open and close than the other.

# ATTATCH YOUR KARABINERS CORRECTLY...

Whether connecting the risers to the lines or replacing karabiners, softlinks can theoretically be attached in several different ways. A novice in the art of light weight connectors could easily come unstuck. Needless to say, there are dangerous ways of using this type of equipment. Here's how to use them, and on the following page, what you definitely shouldn't do...

In the five photos below, you can see the normal, recommended way of attachment. Important: The softlink must go through the straps of the riser/ harness twice to double the strength. And as far as the correct order is concerned, one thing to remember: The loop WITHOUT the tab must go through the loop WITH the tab, UNDERNEATH the tab.


After the softlink goes twice through the loops to be connected together, the end of the loop WITHOUT the tab goes through the loop WITH the tab…


…it then goes over the tab…


…right to the end, it's a bit fiddly sometimes…


…the loop without the tab tightens around the loop with the tab.


Clearly this is not going to come undone by itself!

A close-up of the end result in 5. As we saw in 1, the loop without the tab only passes over the top of the loop with the tab at the very end, thus closing the softlink, but there is a variation…

Photo: Sascha Burkhardt Dessins : Jean Paul Budillon

…equally acceptable: By the second time that the softlink goes through the straps of the riser/harness, the loop of the softlink without the tab on it could already be looped through the one with the tab on it.
The only problem according to Kortel Design; it's narrower and more difficult to do.

Not good: The softlink has been fastened correctly, but the strap has only been looped round once. Its resistance has therefore been halved: 1150 kg instead of 2300 kg. (Admittedly, it's still better than a poor quality maillon…)

Not good: It is fastened correctly, but the softlink hasn't been correctly looped round twice. The same result as on the left: The resistance is halved.

Very bad: The softlink has been correctly looped round twice, but not correctly fastened: The loop without the tab has just been put OVER the loop with the tab. It hasn't gone THROUGH the loop with the tab first. It may hold once under tension, but coming undone unexpectedly can't be completely ruled out.

This is really bad: The softlink has only been looped round once, it has been incorrectly fastened, and the tab is about to come out of the other loop…Not good, not good at all…


GEO4 swift4 ALPINA2 LM5 ultralite3 XXLite RAC2LITE OZIUM OZO F*Lite

# SEE THE LITE

Ozone light and ultralight equipment is the culmination of more than a decade of lightweight free-flight R&D. Our team's passion for vol-bivouac and big-mountain adventure flying has fueled the growth of our range, which features the world's lightest and highest performance paragliding equipment in every category. For more info, visit www.flyozone.com

OZONE
WWW.FLYOZONE.COM

**Photo:** Oliver Laugero

www.profly.org

# GOING LIGHT FOOT

## For long walk-ins, it's important to think about what to wear, especially on your feet!

Of course, from our first paragliding lessons onwards, we all learnt that the best footwear to use covered and protected our ankles…However more and more pilots don't like sweating in heavy hiking boots, and prefer to wear something lighter in the mountains. If you do the same, that's your own responsibility. In which case, there are two models that are particularly comfortable to wear, especially in summer: The Waterpro Maipo by Merrell and the Techamphibian 3 by Salomon. They are both on sale to the public for 90 euros a pair.

As far as supporting your foot is concerned, they are equivalent to a very good pair of tennis shoes. These models allow the heel to be tightened by a strap (the Salomon one is a bit more efficient), making the shoe mould well to the foot. It makes a big difference on uneven terrain.

The big plus for this type of shoe is that you wear them barefoot, without socks. These shoes are ventilated by using breathable mesh fabric.
At the same time, they are smart enough that you could even wear them to work. They are versatile models suitable for both work and play, ideal for activities where 'light is beautiful'.



Salomon Techamphibian 3 vs. Merrell Waterpro Maipo: Two very lightweight designs with soles which grip well to both dry or damp ground. Both shoes are amphibian, designed for sports like canyoning; you can cross a small river in them no problem and they dry off quickly.

Both models are also designed for water sports like canyoning – in summer, we could cross little rivers with our shoes on without hesitating, knowing they'll dry out quickly afterwards. The anti shock soles with a good profile are naturally specially adapted to 'all terrain' walking to get up to take-off.

The adjustable strap on the heel of the Merrells is a bit thinner and a little less efficient…

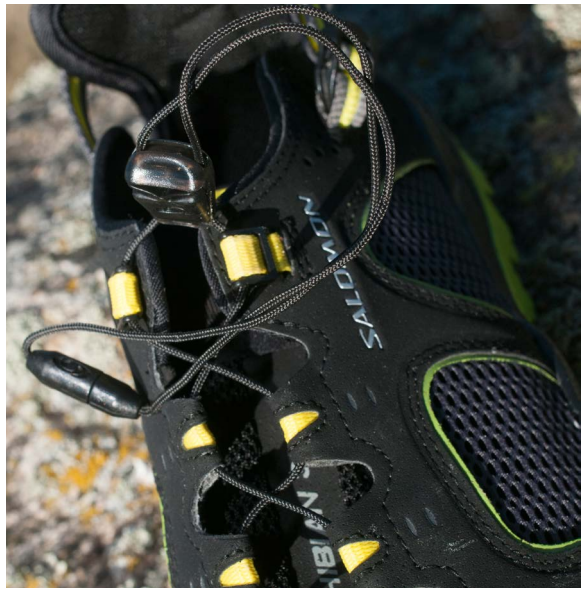
…than on the Salomon one. Once they are correctly adjusted, both models mould well to the foot without unnecessary play.

The Merrells are a bit more enclosed. Both shoes can also be worn in town and in the office…

The holes in the mesh in the Salomon ones are wider apart, thus ventilating the foot more.

## Merrell Waterpro Maipo

## Salomon Techamphibian 3



A normal fastening with laces for the Merrells vs the quicklace system on the Salomons.

Both models have sophisticated soles and an anti-shock system. Both are very nice, even after hours of walking. As the sole inside is a bit more sophisticated in the Merrells, this model is slightly more comfortable.

Weighing between 365 g - 380 g each for the Merrells and 342 g-352 g for the Salomons, they are good company for going on a hike and fly, but there are also some drawbacks:

- During a long walk, the mesh lets grains of sand into the shoe. More so for the Salomons, less so for the Merrells. From time to time they need to be emptied.

- The mesh obviously doesn't protect as well against branches or sharp rocks.

- If later on it's cold in the air, your feet are going to be pretty exposed to that chilly air too...

## SUMMARY

Both models are lightweight practical shoes, with 'going light' in mind! The differences between the two makes are small; you can't say that one model is better than the other.

Merrell are heavily involved in our sport; for quite a while now they have sponsored our champion Charles Cazaux... ■

A different with the Salomons is that you can fold the heel flat and put them on quickly like slippers.

The soles inside the Merrells, more comfortable and removable.


The Whizz 20 with its v-shaped lower surface, obtained by alternating the height of the ribs.

# NERVURES WHIZZ 20

## THE FOLLOW UP TO THE LOL...

The Pyrenean manufacturer has just brought out the Whizz which replaces the LOL. It is much more of a mountain paraglider than the LOL.

*Test pilot: Sascha Burkhardt*

In principal it is a hybrid mountain wing. According to Nervures, the Whizz is the result of using the experience they have gained from making innovative wings like the Kenya for mountain flying, the Swoop for speed and the hybrid LOL. The specifications differ as a function of the size: the 18 is designed for fans of "run & fly" and dynamic flying, whilst the 20 is aimed at a wide range of uses in the mountains, on sites and for travelling, for all up weights of 60 to 95 kg. Together with the 22, it makes up, according to the manufacturer, the ideal kit for alpine paragliding. Nervures want to get the best compromise between weight, ease of launching, quality in flight and ability to land in real conditions, whilst also taking durability into consideration.

## DESIGN AND MANUFACTURE

As far as design and manufacture are concerned, the difference with the LOL jumps out at you immediately. On the Mylars on the leading edge, there are now nylon rods. Not that surprising, as this improves its behaviour during take off as well as in the air.

Rather unusual for a wing of this level, the 'C-wires', which are positioned, partially hidden, in the back part of the profile on the upper surface. These are the nylon reinforcements that are normally found on three line wings at the level of the Cs, which is why they are also called 'C-wires'.

On the Whizz, which is a four liner, they are positioned above the Ds. One of their functions is to keep the wing in the correct shape even when the pilot puts on a lot of brake. Therefore, instead of bending the whole profile, making it lower at the back, the pilot operates a kind of flap which pivots around the rear of this reinforcement.

This improves low speed flight, the behaviour is more linear and often also more direct. The return to normal flight after any sort of stall could be improved. When flying fast, the C-Wires can also help hold the shape of the profile, and on some models, it serves to maintain a certain amount of reflex.

Photos: Véronique Burkhardt


In this photo where the pilot has a lot of right brake on, you can clearly see the 'lowered flap' effect due to the rods positioned in the back part of the upper surface.

Another technique which is very in vogue at Nervures and used on the Whizz is the V-shaped surface, alternating normal ribs with smaller ones, thus reducing the weight. This gives an unusual aspect, indeed a false impression of it having been stitched incorrectly.

The fabric used is of course 100% Porcher, of which a large part is 27. Not surprising, given that this 'light' material, widely used by practically all of the manufacturers in their lightweight wings, was developed by Porcher together with Nervures.

## TAKE-OFF

Taking off is a formality. The wing, roughly laid out, comes up in a fairly compact manner. When you play in strong wind, it stays fairly homogenous, if the pilot controls the turn just a little bit. After it comes up, the wing stops above the pilot without any tendency to over fly: Very nice and easy. Taking to the air is correct, better than on the LOL, it is nearer to a classic paraglider, whilst keeping its 'hybrid' classification.

In flight, its behaviour at low speeds seems effectively to be linear and there are no surprises. Also, when flying fast, the wing has better performance than the LOL. In thermals, this low aspect ratio wing remains solid in the centre. It moves slightly along the length of the wingspan.

A good partner for the Whizz is the X-pyr harness made by the same manufacturer. It's a lightweight hammock harness with removable pod (removed in this picture). The pilot is protected by a 12 cm thick foam bag. Weight 2.5 kg, available in size ML.
Price 990 euros.

A particularity at Nervures: the pulleys on the accelerator are positioned between the straps on the risers. With this type of riser, the Whizz 20 weighs 3.05 kg according to the manufacturer (3.1 kg on our scales). The pilot can also opt for Dyneema risers and unsheathed lines. In this configuration the weight drops to 2.73 kg. The declared top speed is 49 with maximum all up weight; we got about 45 km/h with an all up weight of 85 kg.

The rods known as 'C-wires'.

The leading edge rods can be taken out if necessary.

A wing going into a steep turn. The sink rate in the turn is a bit higher than on a classic wing.


Photo: Sascha Burkhardt

The Whizz has a low aspect ratio (4.8), which is normal for a hybrid wing. On the other hand, the technology which has gone into the design, like the C-wires, is more typically seen on higher performance gliders.

| TECHNICAL CHARACTERISTICS AND PERFORMANCE. NERVURES WHIZZ 20 ((INFORMATION FROM THE MANUFACTURER) | | | |
|---|---|---|---|
| Manufacturer : NERVURES - ZI Point Sud - F- 65260 Soulom<br>Email : com@nervures.com - Tel : +33 (0)5.62.92.20.18<br>www.nervures.com/fr/ | | | |
| **Model** | 18 | 20 | 22 |
| **Surface (m²)** | 18 | 20 | 20 |
| **Flat wingspan** | 9,2 | 9,8 | 10,4 |
| **Flat aspect ratio** | 4,8 | 4,8 | 4,8 |
| **All up weight when flying** | 55-75 | 55-95 | 60-100 |
| **Optimal all up weight** | 75 | 85 | 52 |
| **Maximum speed (+-2km/h)** | 50 | 49 | 48 |
| **Trim speed (+-2km/h)** | 42 | 40 | 40 |
| **Weight with thin risers and unsheathed lines, in kg** | 2,58 | 2,73 | 2,84 |
| **Weight with normal risers and sheathed lines, in kg** | 2,95 | 3,05 | 3,15 |
| **Certification EN 926-2** | C en cours | B | B en cours |
| **Price in euros** | 2 300 | 2 300 | 2 300 |

Even though it gives a lot of direct feedback it's comfortable, the pilot feels very confident and, all in all, it didn't give us any nasty surprises. It goes into the turn fairly quickly, but its sink rate is greater.

This is where this hybrid is once again a bit nearer to a mini wing than a classic paraglider. But, once again, compared to the LOL, you can work the thermals very efficiently.

It isn't a wing which is designed for turning flat, but rather for playing thanks to its easy handling and its turning ability. On a dune, with enough of a breeze, it does equally well…

Landing is partially helped by its low speed qualities. Nonetheless, a nice amount of speed is advisable to land smoothly.

**SUMMARY :**

This hybrid wing is a step up from the LOL that it replaces. The new technology used has brought it nearer to being a classic paraglider. The ease with which it takes off, as well as the confidence it gives, makes it very versatile in a hybrid category, and very close to conventional but bigger and heavier wings. ■

TEST

MY FIRST

# FLIGHT IN A NEO STRING

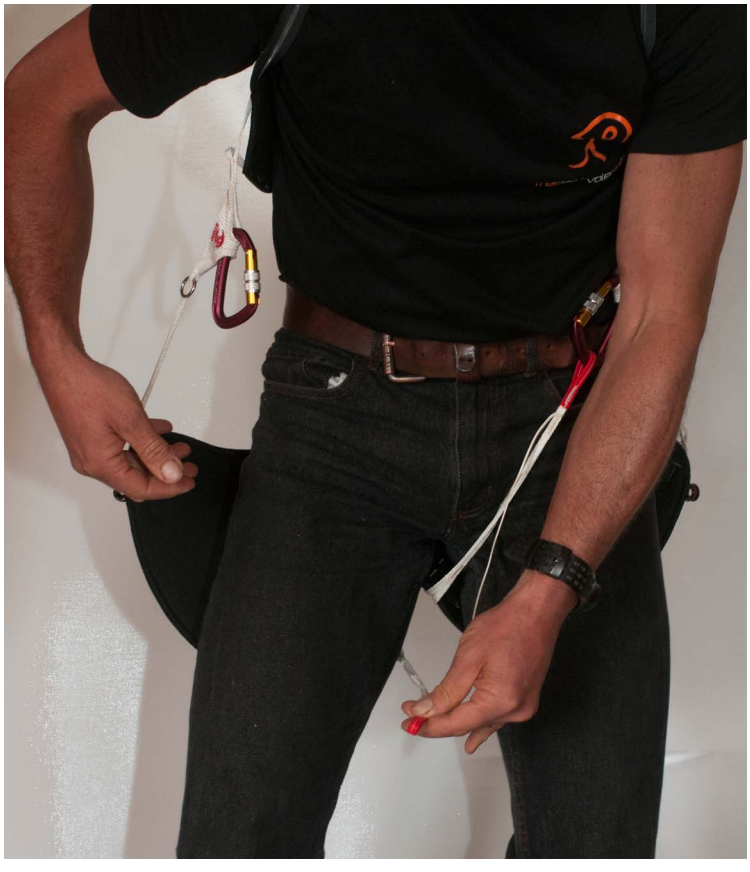
I've know many harnesses in my 25 years of paragliding. 'Normal' harnesses, tandem harnesses (comprised of two bits of board), lying down harnesses, standing up harnesses, acro harnesses, not to mention my first little hike and fly harness at the beginning of the 1990s.

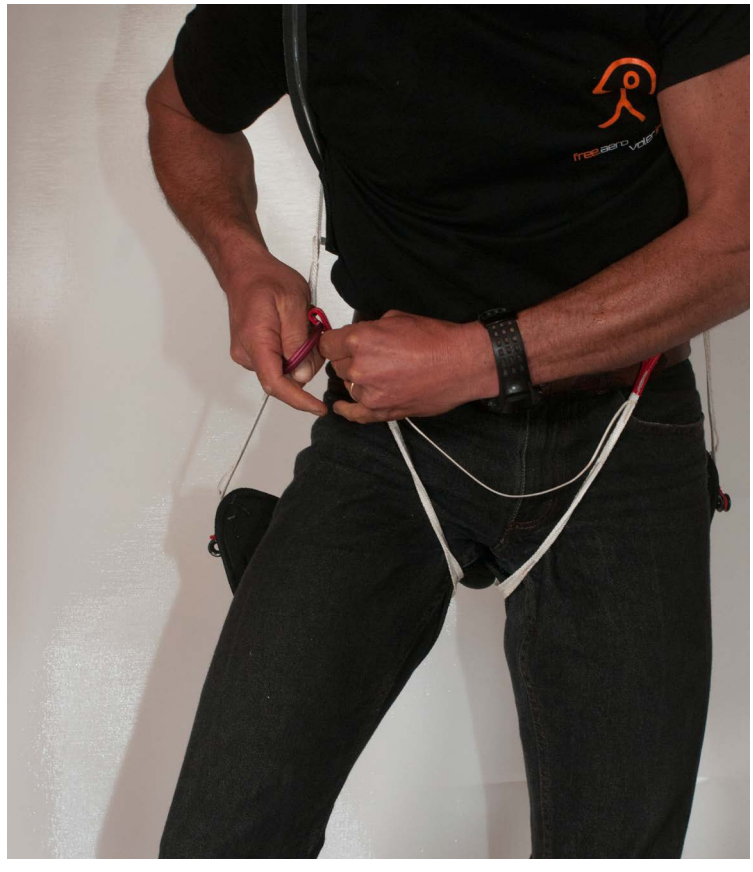
Even so, flying a String was a whole new experience for me. A harness weighing barely 300 grammes, two bits of material under each thigh, a bit of cloth behind my back and all (including the pilot) held just by Dyneema cords, barely thicker than shoe laces.

Very reassuring…But it does actually hold together. The 'shoe laces' can support a weight of one tonne; this was confirmed by a laboratory test. And, after a more in depth test of this material (see article in this edition), it really does work.

However… the spiral was, in the end, a bit more timid than usual.

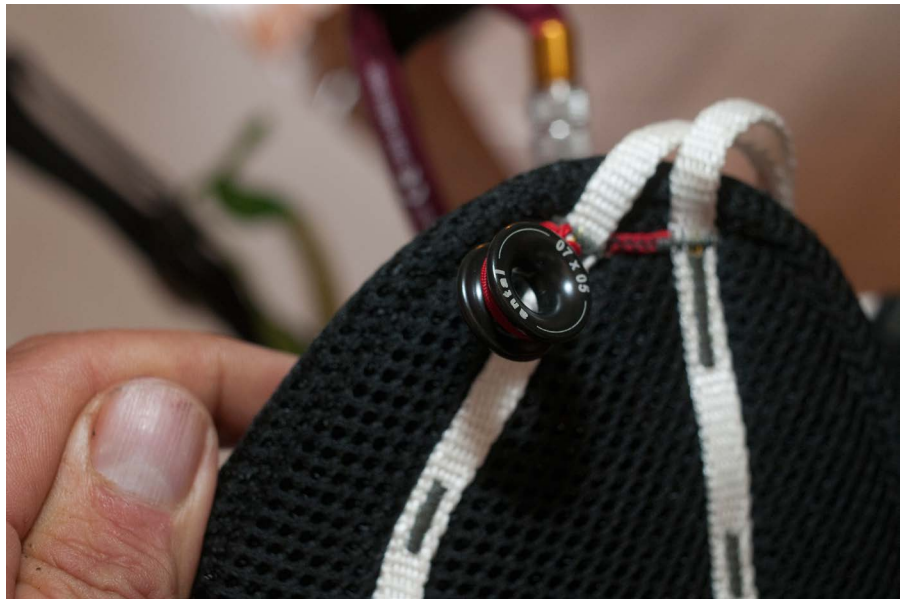
A nice touch: thanks to the karabiners, the pilot doesn't have to put his feet through the String, but clips in like a 'real' harness…






An aircraft seat that weighs 400 grammes and fits into a small pouch. Dyneema works miracles…

The Neo String costs 290 euros without karabiners and 320 euros with karabiners.
http://www.flyneo.com/sellettes-neo/#string



A frictionless ring serves as a pulley if the pilot wants to add an accelerator. This harness isn't just for doing ploofs, but is also good for doing thermic flights and small XCs.

## STRING

This harness from Neo is truly minimalist. It takes up no space and you can easily put it into a small bag. It weighs a little over 310 grammes on our scales, within the 290 +/-10% of tolerance claimed by the manufacturer. Add 75 grammes for a pair of Grivel ultralight karabiners, and you have a seat for your aircraft weighing less than 400 grammes.

The Grivels are more or less indispensable. You could use softlinks, but the benefit of karabiners is that they can be used to put the harness on and to fasten the chest strap very comfortably, without having to step into it.

The harness adjustments have been reduced to a minimum, a piece of Velcro at the back alters the length of the elastic shoulder straps. The width of the chest strap is fixed and is roughly a standard 42-44 cm.

Once on, this harness doesn't cause any problems. It is easy to walk and run in and it is surprisingly comfortable when playing in strong winds on the ground.
This type of exercise, with lots of take offs and landings, quickly becomes uncomfortable with lots of so called 'comfortable' harnesses.

Not with the String, if you take away the total absence of back protection, it could even be considered an ideal harness for this sort of exercise…


The hang point and fastening system: the red loop comes from the chest strap. The pilot clips it into the karabiner to fasten it. The little ring, bottom left, is used for the accelerator.

## SPARTAN, BUT COMFORTABLE.

In the air it's surprising too. You can actually sit quite comfortably in the String. It doesn't dig in anywhere. Despite the sparse use of material, the rigid parts are substantial enough.

The pilot feels sufficiently well supported and confident (well almost). Steering by weight shift is very easy and both legs being separate actually helps.

## CONCLUSION

Subjectively, one can't help feeling a little uneasy; this stays with you for the first few flights. On the objective side, there is also the absence of any back protection. From a comfort point of view, it isn't a harness that you would choose for an 8 hour XC, but there is nothing to stop you comfortably staying in the air whilst efficiently coring thermals after a lightweight walk to an improvised take-off on the other side of the mountain.

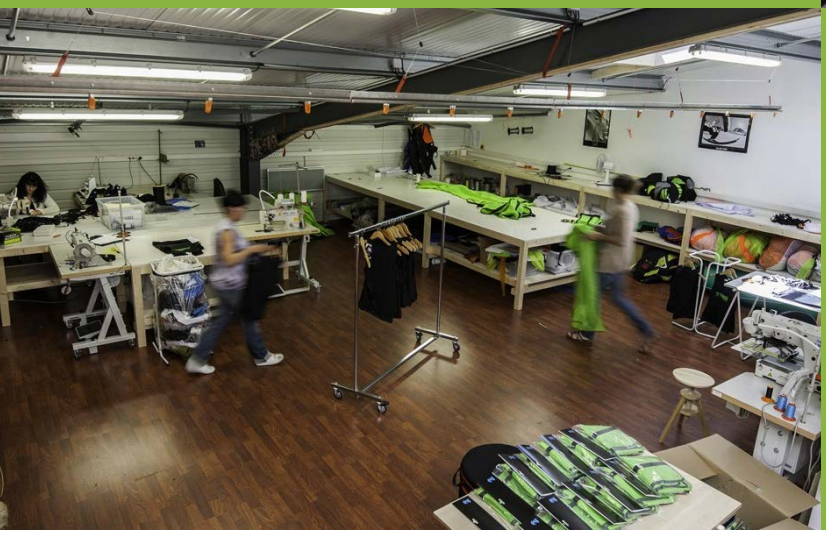
String harness tested: Size M, certified to 100 kg maximum weight in April 2013 at Paratest. Since then the String has also been made in sizes XS and XL.

Price: 290 euros without karabiners, 320 euros with. Less than one euro per gramme... ■

The load test report for Neo's String harness: http://www.flyneo.com/wp-content/uploads/PDF/rapport_de_test_string.pdf


The only adjustable part: A piece of Velcro on the back to adjust the shoulder straps.

# THE NEO WORKSHOP



## MAKING NEOS

Neo, manufacturer of the String, are heavily committed to 'Made in France'. The harnesses are assembled in France in their workshops in Haute-Savoie and in Normandy.

According to Neo, their decision to produce locally, in a spirit of work force participation, allows them to produce high quality products.

Furthermore Neo claim to use only EU materials, for example, the fabric, straps, lines, karabiners, thread and hardware…

# NEO S-RIDE

**THE NEO: NEW FRONTIERS**

For the winter season, Neo are taking up speed riding as well - another facet of lightweight flying. During the winter, we're going to be testing in greater depth the wings and accessories on sale for the first time at the Coupe Icare 2014.

Photo: Neo


Photo: Sascha Burkhardt

# KORTEL HARNESS KRUYER II + SAK II

The Kortel Kruyer II is one of the lightest harnesses made by the French manufacturer; the Sak II transforms it into a reversible harness.

With the Kruyer II, the extra saving in weight required by the specifications, compared to the first version, was obtained by using new materials. Amongst others, the Kevlar strap was replaced by Dyneema which is lighter, whilst ensuring the same strength. The result, 320 grammes in size M.

A second point in the specifications concerns comfort: Despite its minimalist look, it must be comfortable even during longer flights. According to the manufacturer, the improvement in comfort has come from improving the leg and thigh support as well as using a new type of foam.

It was on the Kruyer II that we saw for the first time, the system of adjusting by splicing. Instead of having loops on the straps, the adjustment is done by a clever system whereby the Dyneema cord is threaded through its own mantle after forming a loop.

The adjustment to the physique of the pilot works very well and very fluidly thanks to this system borrowed from our seafaring friends. See the system in detail in the pages about Dyneema in this article.

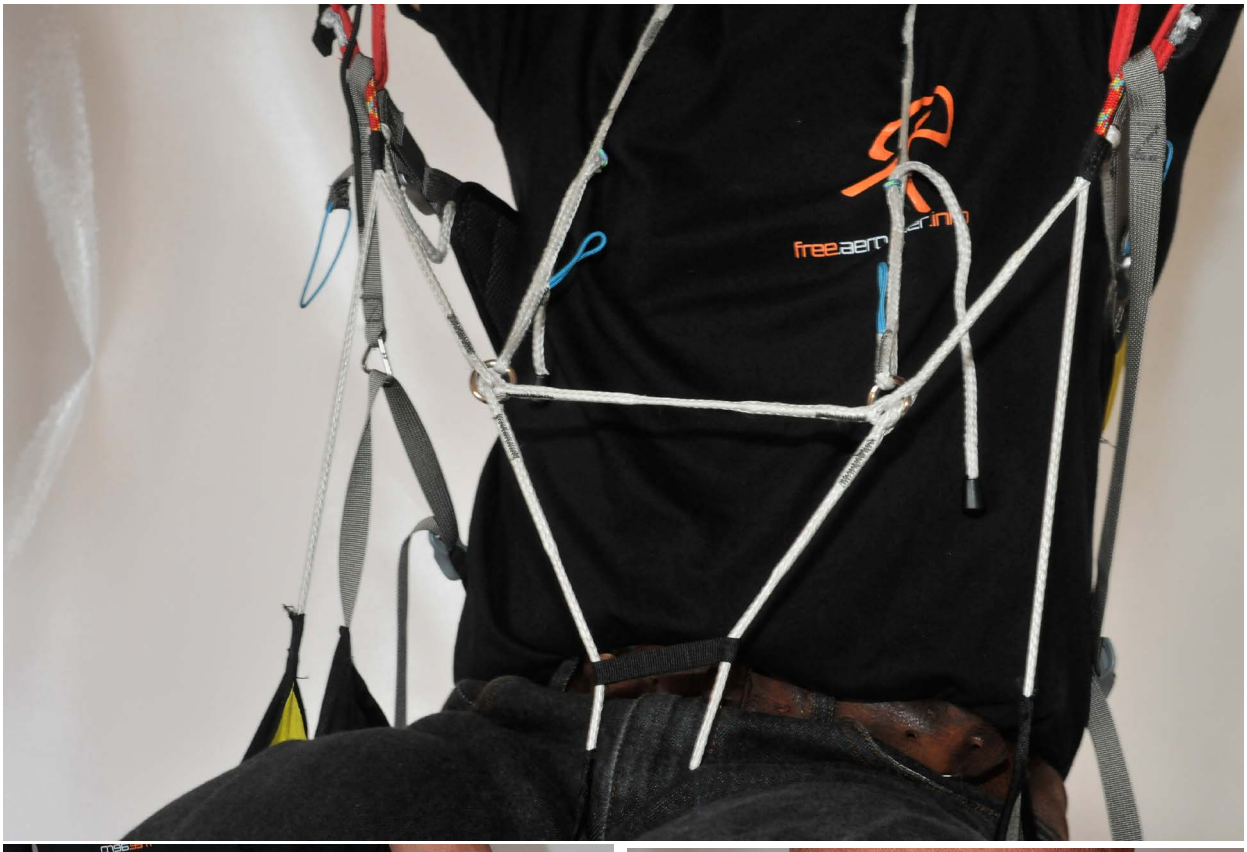
In addition, with this minimalist harness, it is possible to add an inflatable back protector, the Sak II. It weighs 985 grammes. This airbag with a capacity of 60 litres is reversible and removable.

With the Sak II airbag protection, the Kruyer II is even LTF certified in Germany.

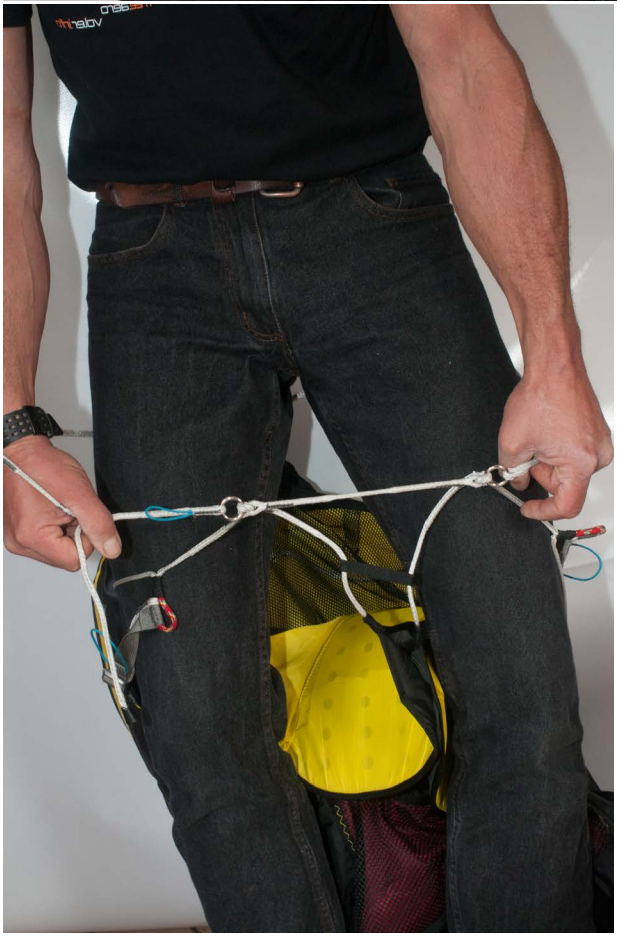
We tried the Sak II with the Kruyer II and found that Kortel harnesses' reputation for astonishing comfort was reinforced.
No doubt, thanks to an intelligent mix of carefully placed reinforcements and well thought out adjustments, this harness is really very nice in the air.

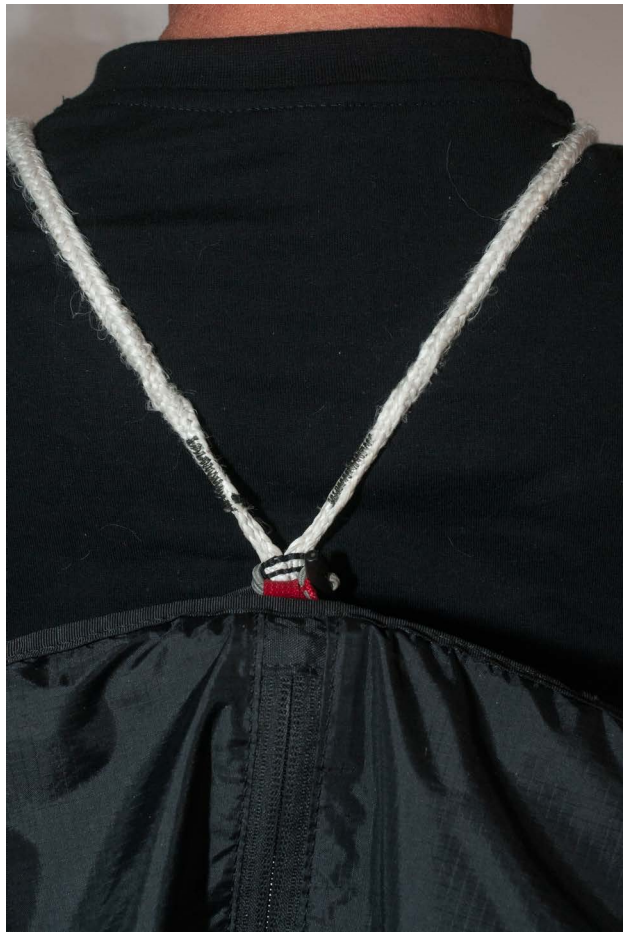
The combination works well, the Kruyer II allows efficient piloting by weight shift, whilst at the same time being comfortably stable. It is equipped to allow a foot accelerator to be added.

The Kruyer II harness with the reversible airbag, the Sak II, attached to the back.



Based on Dyneema lines, the harness offers a good compromise between light, comfortable and adjustable.





To clip in, you have to put the harness on over your feet. The thread frays a bit, but as long as that doesn't become unreasonable it won't affect its strength.

A close up of the Sak II.
Very neat!

A slight inconvenience with this harness is that you have to step into it with your feet – after a walk in through mud and damp vegetation, we would prefer a clip-in system like on Neo's String.

The Sak II fastens on very quickly, for once and for all, to the Kruyer II (or any other mountain harness). It then stays in place, making the ensemble into a reversible harness.

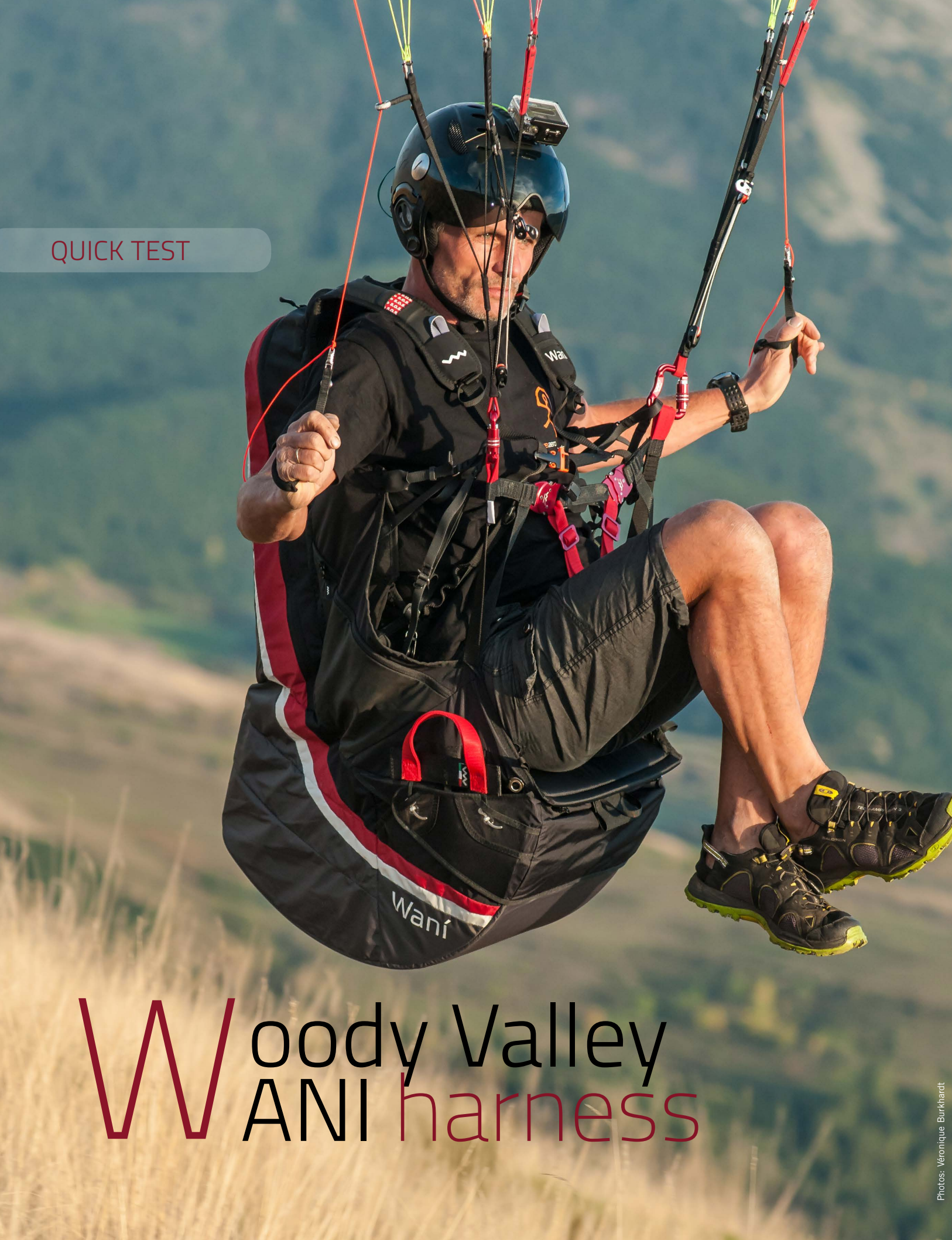
It's quick to convert the Sak II from a harness to a rucksack and vice-versa. The bag's volume of 60 litres is enough for a mountain wing. A normal wing needs to be folded well to fit in. On the bag, the manufacturer has, amongst other things, added loops for walking polls.

The LTF certification for the back protection proves its effectiveness. The airbag inflates quickly through the fairly large opening. The ensemble weighs 1255 grammes (on our scales), very little for a reversible harness with certified protection…

The Kruyer II is available in four sizes S, M, L and XL with a weight range of 285 g to 375 g. It costs 261 euros. The Sak II weighs 985 g and costs 236 euros. The pilot can add a waist reserve container (65 euros) and add lightweight reserve risers in Dyneema for 30 euros. ■

The development and the after sales service are located in France at Sallanches, at the foot of Mont-Blanc very near Chamonix. Photo: Kortel Design

QUICK TEST




# Woody Valley WANI harness

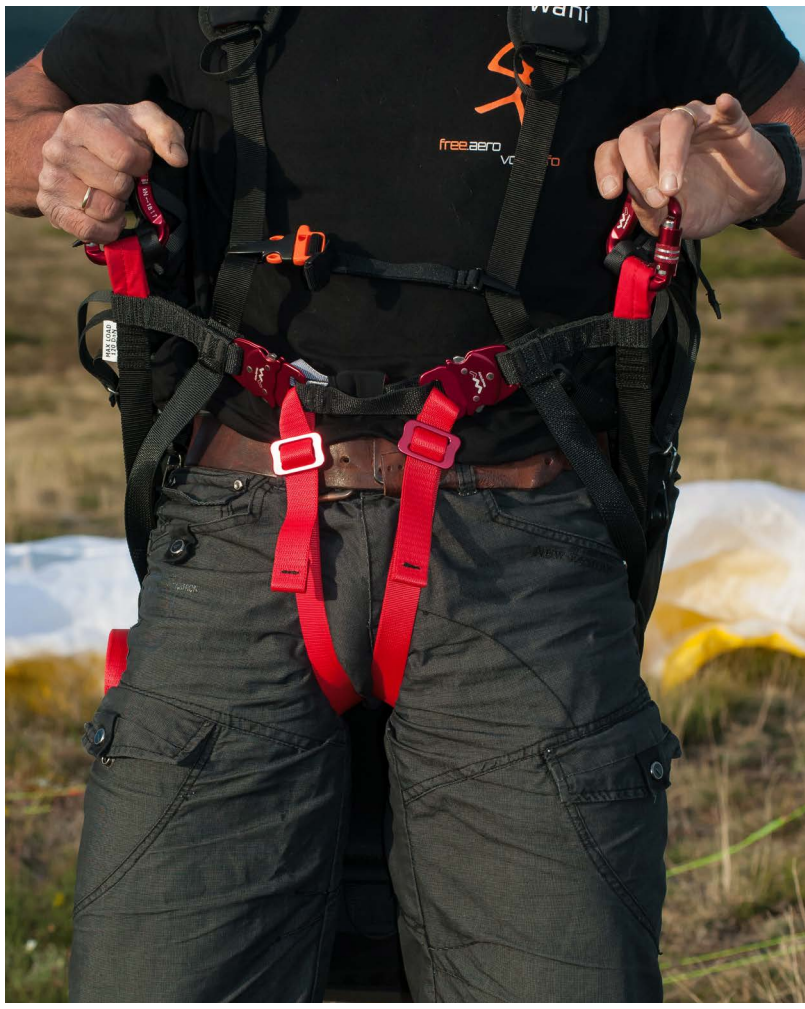
Photos: Véronique Burkhardt

# WANI

At Woody Valley, the Wani replaces the Voyager Plus. This reversible harness weighs 4.2 kg and really lends itself to hike and fly. Its airbag is inflated by a spring, which assures immediate protection.
In addition it's very efficient: During a DHV type test, the Wani was the harness with the best scores, 21G! On the other hand, the upper part of the back is less protected than on other harnesses.



The airbag on the Wani isn't inflated by the airflow, instead it keeps its shape thanks to a built in spring. At take-off the device is therefore immediately operational and protects the pilot during launch.



The Wani is made in two versions: With a classic buckle system and a 'Get-Up' system. This model is the 'Get-Up' system. There are no leg loops, the two buckles close to make a chest strap. It's quick to do up, allowing you to walk or run freely and is comfortable in the air. On the other hand, at take-off, if the pilot plays for a long time upright in the wind, the straps rub uncomfortably. Pilots used to inflating in strong wind would be best to choose the classic buckle system.

Right from the beginning, we found it nice in every respect (carrying it, getting into the harness, handling), except the comfort during prolonged ground handling.

Obviously this isn't the strength of the optional "get-up" buckle system that the harness we were trying out was equipped with, making it too tight between the legs.

# WANI

# WANI


The Wani in detail: in 'rucksack mode', generous padding and efficient ventilation make carrying it pleasant during long walk-ins. Weighing 4.2 kg, this harness can already be classed as lightweight. We're looking forward to seeing the 'light' version of the Wani that the manufacturer has told us about.

A nicely finished off bit of work with useful extras like the passage for a drinking tube.

# WANI

The useful volume of the rucksack seemed a bit small, due to the spring system but you just need to follow the instructions when packing the wing and it will all fit in.

A very innovative harness with its spring protection and its new rucksack system. The Wani comes in three sizes (M, L and XL). ■


Another unique feature of the Wani: It's a reversible harness with integrated rucksack.
Explanation: On a classic reversible harness, the panel with the zip on the back pocket of the harness doubles up as the panel with the zip on the rucksack when the rucksack is being carried on the pilot's back.

On the Wani, Woody Valley have integrated a piece of material which transforms into a rucksack – this freed the manufacturer from a certain number of design constraints, in both the harness and in the rucksack

Photo: Véronique Burkhardt

A single skin wing, a cage with a single hoop: The ultimate in going light?

# THE SKY'S THE LIMIT: LIGHTWEIGHT PARAMOTORING.

# LIGHTWEIGHT PARAMOTORING

Photo: Franck Simonnet

In paramotoring, we're also trying to lighten our material. It makes a big difference to run with 20 instead of 30 kg on your back. But it isn't just the saving in weight that counts. Making the material more practical, more compact and more comfortable in the air, is the manufacturer's goal too.

*Written by the editor of free.aero/voler.info*

A Miniplane taking off.
Setting off light, what bliss!

One of the lightweight pioneers was the Miniplane: A cage made of glass fibre and a little motor (the Top 80), and you have a paramotor weighing less than 20 kg. It's a life changer! Obviously, this loss of weight has its disadvantages. If the pilot lands badly, the cage twists very quickly towards the propeller, generally a fairly painful experience for one's wallet!

Worse still, even if the pilot does everything correctly and takes off elegantly accelerating the inflation with the propeller, just the compression of the cage by the lines can be enough for it to touch the propeller. The same problem can happen on any scale with aluminium cages, or even with stainless steel, if the pilot puts on too much power. A possible answer is to profile the cage tubes. For example the tubes of the cage on the XRace by Adventure are of very thin aluminium (0.8 mm), but their profiles give them greater strength in the direction of the stress from the lines. The tubes resist up to 60 kg per metre or 6 times more than in other directions.

## THREE CHEERS FOR TITANIUM

Whilst looking for other lightweight alternatives, the manufacturers also discovered titanium. It is a very strong metal, with a density of 4.5 g/cm$^3$ compared to 7.9 g/cm3 for steel. Its light weight makes it ideal for use in aviation. The stealth bomber, the Lockheed Martin F-22 Raptor, is made up of 40% titanium. The more pacific Airbus A380, contains 10%, double that of its predecessors.


Lightweight chassis, motors that get lighter and lighter. Above, the famous EOS 100 on a Miniplane chassis. Below, a Miniplane chassis being put together: The cage made of glass fibre is put together like a tent with hoops.

There are different titanium alloys which differ according to the percentage of other materials that they contain, such as aluminium and vanadium. The manufacturers choose the type of alloy (the 'grade of titanium') as a function of the compromise between breaking strength, elasticity and weldability.

It is often said that this material is more difficult to work and to weld than steel. This is partially true. Titanium needs more protection by an inert gas when it is being welded and, depending on its alloy, it can be difficult to shape. Titanium therefore costs more in labour, but above all to buy; it costs eight times more than aluminium and twice as much as stainless steel.

Although it is stronger than aluminium, titanium is heavier. You could theoretically replace a 1 mm thick piece of aluminium with even thinner titanium but, in practice, that is difficult to do. For that reason Adventure haven't replaced the aluminium cage on their X-Race LT with a titanium cage: the aluminium they use is already very thin. On the other hand, by using titanium to make the exhaust pipe, Adventure say they have saved two kg on this part alone!

*(Continued on page 61)*

A Polini Thor 100 motor on a Miniplane Chassis.

Luc Warth, a Miniplane dealer in France, has found a way of overcoming the fragility of the cage on the Miniplane; this bar clips onto two of the radials.

This device protects the cage against compression by the lines during take off. It could even be useful during a little power inflation. Price: 65 euros.
Photos: Luc Warth **www.alsaceparamoteur.com**


Photo: Franck Simonnet (www.simonnetphotography.com)

Adventure are aiming for lighter and lighter. Since 2011, the French manufacturer has been making the X-Race chassis, already lighter and more compact to fold, than previous systems.
From now on, the X-Race LT version will save even more kilos…

## THE PAPI HARNESS.

Why not? The paraglider and harness manufacturer Apco are experimenting with ultra light harnesses like mountain harnesses.

The main advantages according to the pilots who fly this make are that, as well as being more comfortable whilst getting ready on the ground, taking off is also nicer, because there is less roll or turn induced by the torque of the motor. In the air it is nicer to fly.

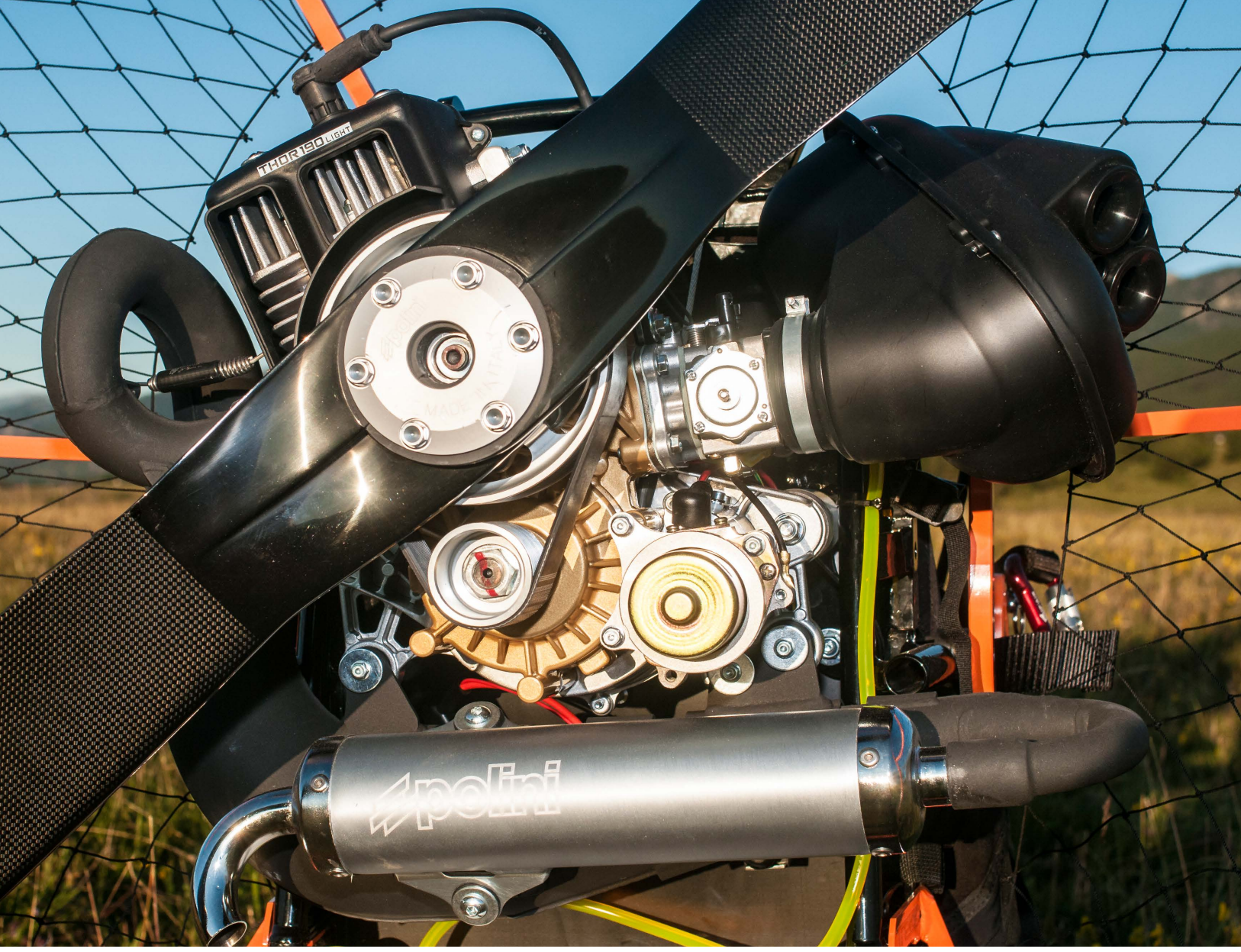
All the same, one wonders whether in turbulence, this system wouldn't give too much feed back. To be tried out…

A pioneer of lightweight paramotoring, Ales Hubacek, owner and designer of the make Skyjam, did a hike and fly along part of the Chemin de Saint Jacques de Compostelle. That was back in 2012 with his 15 CV ST-12 motor weighing 22 kg on his back. 770 km in the air and 156 km on foot...

Ales really appreciated the light weight of his machine, accomplished by the use of titanium for the chassis and for the cage.

On the other hand, for the exhaust system, he preferred to use classic materials.

**http://www.skyjam-paragliders.com**



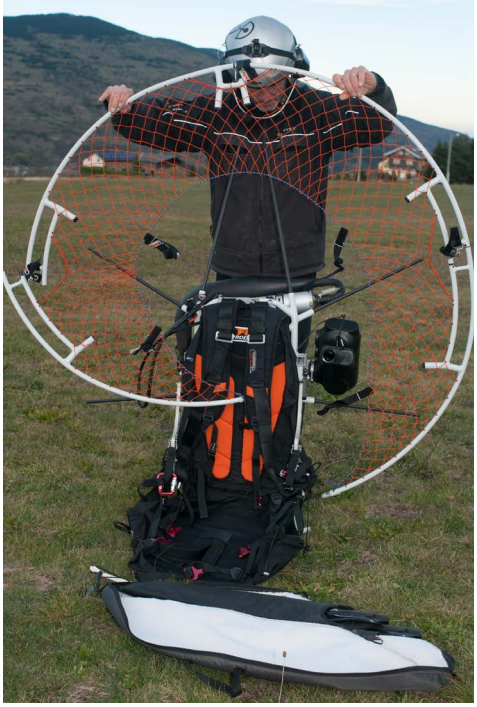

A very powerful paramotor, which at the same time keeps a watchful eye on its weight, is the Polini Thor 190 light. It has almost the same motor as the Polini Thor 200, but with a belt reducer instead of a gearbox. On our scales it weighed 16.8 kg (with electric starter). That's a saving of nearly 2 kg compared to a Thor 200 or a Simonini Mini 2 plus. On the other hand, the 190 light seemed to be a bit more temperamental when adjusting the carburettor, than its heavier brother.


*(Continued from page 57)*

The reduction in weight made possible by using titanium is often only partially taken advantage of by certain manufacturers; they keep the sections quite substantial. Often, the machines are just a bit lighter but, above all, a lot stronger.
As titanium is also very resistant to corrosion and acids, the manufacturers don't varnish the cages, but leave their shiny metal on show.

**OTHER SAVINGS.**
Making our aircraft lighter, can also include the harness. This is where the manufacturer Adventure has turned their attention. The lightweight XRace LT harness has allowed a saving in weight of 1 kg, being only 2.4 kg.

*(Continued on page 66)*



Another Italian manufacturer is becoming increasingly interested in lightweight equipment: Fly Products. The Rider S4 is available with two different cages; with a single or a double hoop; there is a difference of more than 1.1 kg.
Below, the one in the picture on the left weighs 30.84 kg and the one in the picture on the right weighs 29.74 kg. But that isn't the only advantage of the simple cage. It folds up in a much more compact fashion too. It is very practical when travelling… In both versions, the radials on the cage are made of carbon. They're light, very strong and they take up practically no space. In the picture in the middle, you can see them packed away in their little bag.


RSultra with their Kangook Trekk and Trekk cage is another manufacturer which uses a cage that dismantles into a bundle of rods.
Here too, it isn't just the saving in weight which is most important, but the volume of the dismantled machine. The collapsible cage weighs 2100 grammes, while the solid Vikking cage weighs 2930 grammes, giving a saving of 830 grammes. But, above all, the bundled up cage can go into hand luggage…

A Kangook Trekk chassis with a collapsible Trekk cage. Obviously, the cage isn't as solid as the Vikking cage.

Quicker to assemble than the collapsible cage, it is incredibly robust and weighs 830 grammes more. On the other hand, the segments of the cage take up space after it has been dismantled.

Photos: Sascha Burkhardt

Titanic: The chassis of this Libelle from the manufacturer FTR, which we tested in 2010, is made of titanium tubes that are partially profiled. The weight of the configuration tested: 26.5 kg.

In 2007, we saw the strength of a titanium cage with this Orbiter from a German manufacturer. Unfortunately this company has since ceased to be.

A close up of the Orbiter in 2007. The manufacture of a cage with profiled titanium tubes is fairly complex and, on the face of it, doesn't seem profitable unless made in an eastern bloc country like Russia where the titanium can be obtained directly from the manufacturers.


In France, Laurent Fourgeaud's company Air Conception have gone for titanium too, even for the first part of the exhaust pipe. On the other hand, Laurent doesn't use profiled tubes. The advantage of round tubes compared to profiled tubes is that after a bump, you can often repair them…

The resonance chamber made from titanium in this exhaust system is made by a process of pressing which avoids too many welds.

The Airmaster Profi - 500 R is a Russian trike made from titanium. Empty it only weighs 86 kg, not much for a tandem with an all up weight of 360 kg…

*(Continued from page 61)*

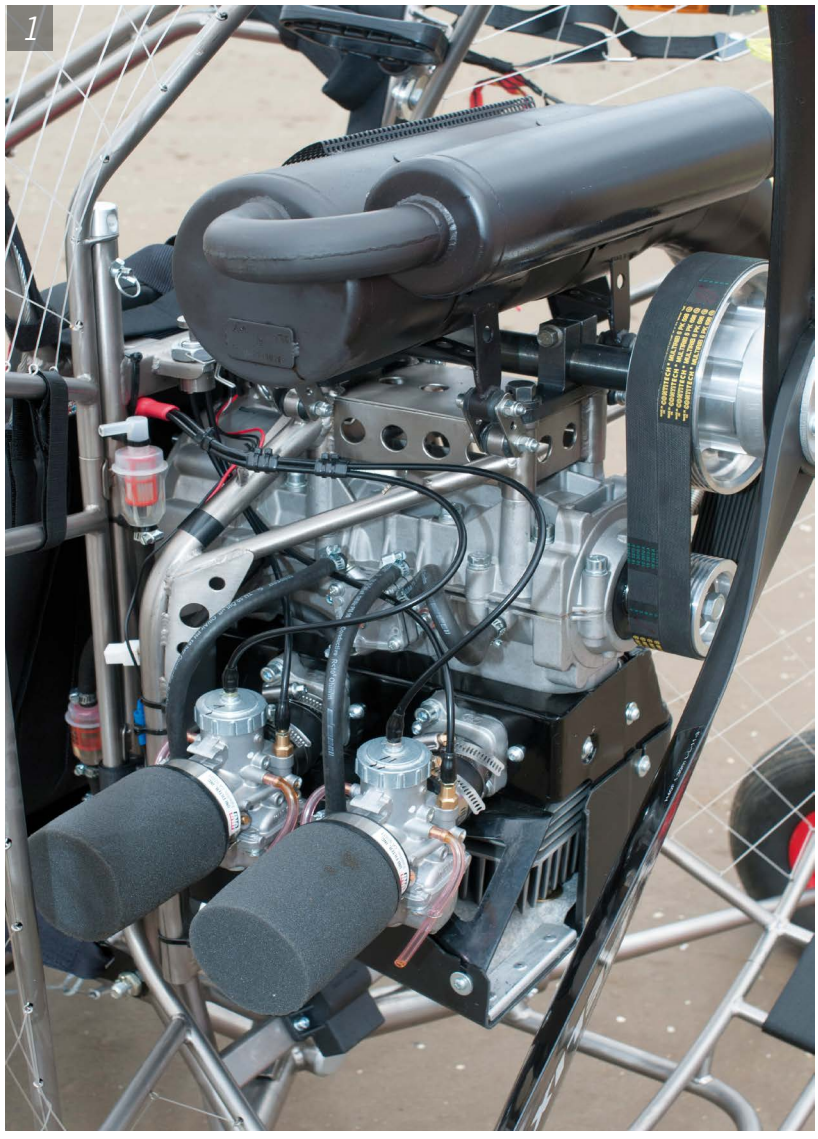
Other eventual avenues include further savings in weight in the motors. But reducing the weight of the crankshaft or other moving parts could, according to certain manufacturers, reduce their lifespan.

Laurent Fourgeaud from Air Conception doesn't share this opinion. In fact this is what he is working on and thinks has great potential. One possible avenue: ceramic bearings, like those used in Formula 1.

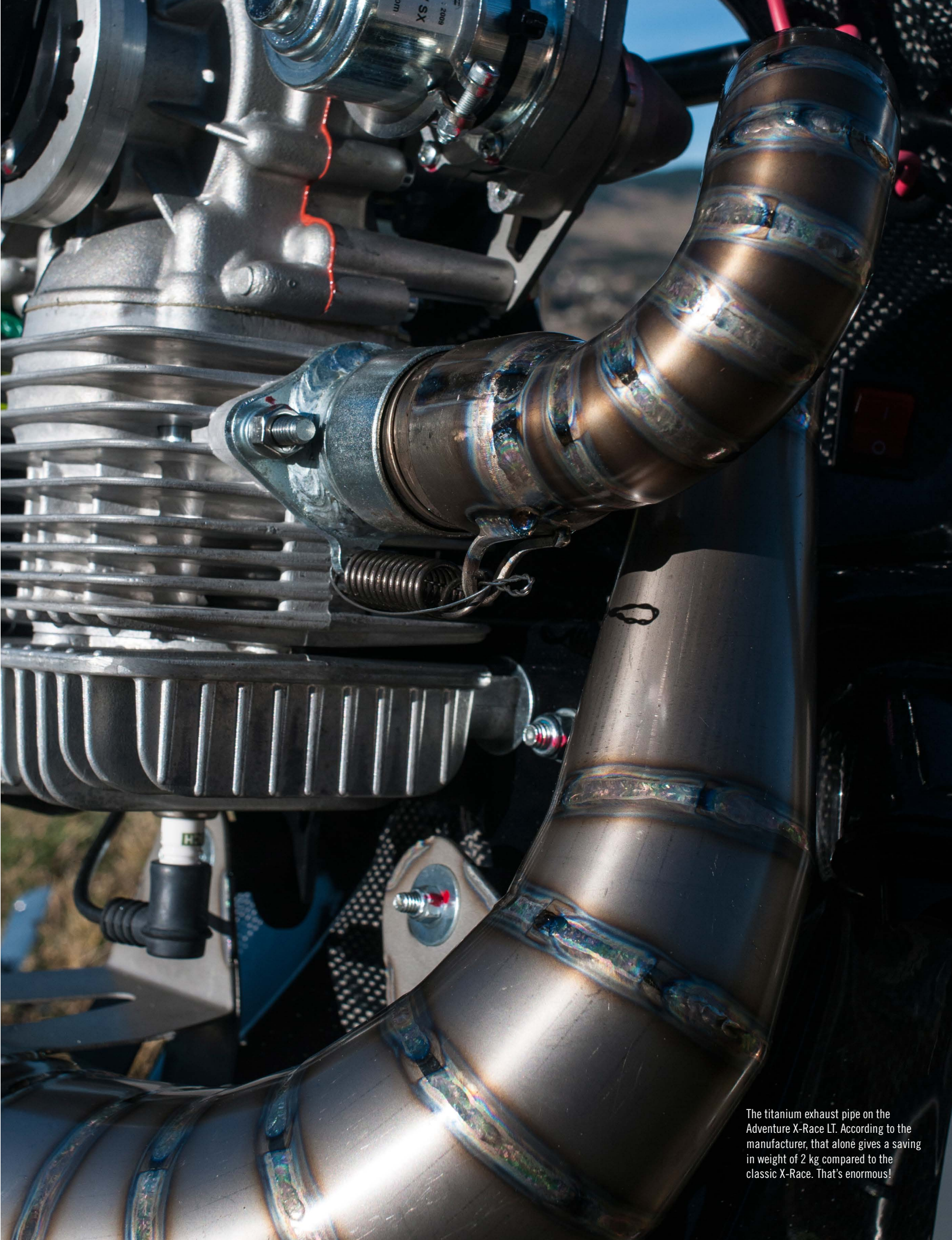
1. The motor on the Airmaster Profi - 500 R is a PMR 3500, a Russian copy of the legendary Rotax 503. The PMR 3500 is mainly used in a certain type of snow scooter in Siberia. The 497 cm3 gives 52 HP at 6400 rpm.

2. The machine costs around 16,000 euros. Unfortunately, the manufacturer seems to have stopped production. The European importer www.skyjam-aircraft.com, hasn't had any contact from their Russian friends…

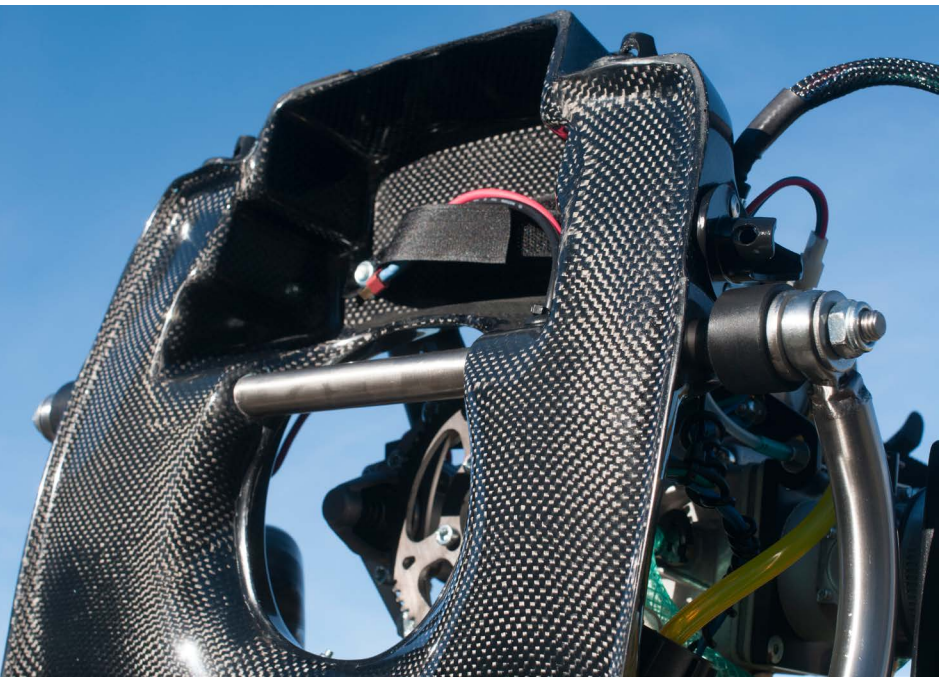
3. An important point which is often ignored: the lack of protection for the passenger.







The titanium exhaust pipe on the Adventure X-Race LT. According to the manufacturer, that alone gives a saving in weight of 2 kg compared to the classic X-Race. That's enormous!



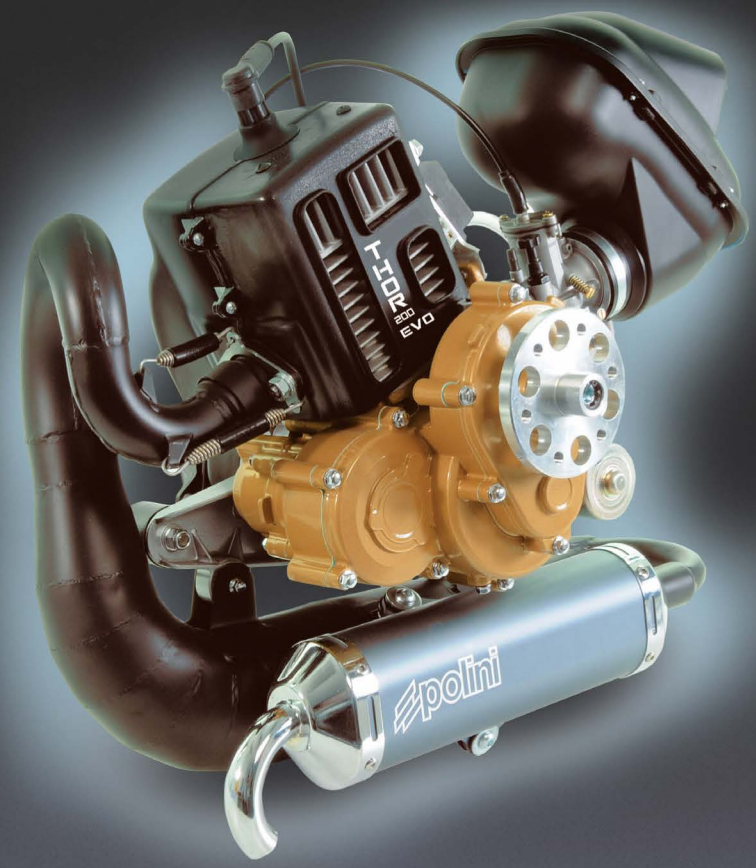
On the X-Race LT, the transverse bar which takes the strain from the hang points is also in titanium rather than stainless steel. The other trick that Adventure have used to make the engine lighter: the shell is thinner and more open.

The profiled tubes on the Adventure X-Race are the same as on the classic X-Race, they are also in aluminium and will stay that way. Made from sheets of aluminium of only 0.8 mm, they are already very light. The profiling, despite being thin, gives them good strength.

# THOR 200 EVO
# THE FLIGHT EVOLUTION

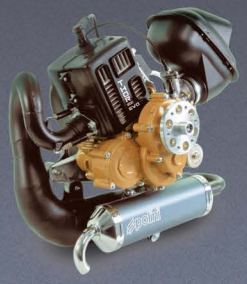
## MORE POWERFUL, MORE RELIABLE.

Discover the purest pleasure of flying. THOR 200 EVO sets new parameters in terms of performance and reliability of its category. The technical solutions that have been introduced improve the cooling of the engine with lower operating temperatures. Great careful has been dedicated to the carburetion setting, with the aim to offer a more reactive, full and constant power output at all the rpm. This means more efficiency, torque increase and considerable reduction of consumptions. With Thor 200 EVO Polini consolidates even more its role of sky leader in the heart of all its fans.




THOR 130

THOR 190 LIGHT



THOR 200 EVO

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# A lightweight 'jerry can'.




At http://www.ulmtechnologie.com, we found this flexible fuel tank, the "Jollytank", for… 3,5 euros! It's ideal as an emergency fuel tank, whether for long distance/vol bivouac or local flying. Empty and folded, this petrol tank weighs 50 grammes and will fit into any harness pocket.
If you run out of fuel in the middle of the countryside, you can go to the neared petrol station and fill it with a maximum of 8 litres. There is a very simple but reliable system to close it. It's completely watertight, unless you leave it full for several weeks, in which case it gives off a gentle smell of petrol. Its pouring nozzle is good enough to fill up your tank and it is reusable.

Obviously you need to add the oil to give a two stroke mix. Fill a little bottle from the pharmacy with the necessary quantity of oil to give the correct mix. Mark the amount on the bottle, so that in a few months time when you need it, you'll know how much to fill it.

Wrap it all in watertight freezer bags and put this 'survival kit' in your harness…


## WHAT ELSE IS IN STORE FOR PARAMOTORS?

# LIGHTER WINGS

We've already seen it several times, and it was confirmed during our test comparing the Trekking Senso with the Senso Sport (free.aero, December 2014). A lighter wing doesn't just come up more easily, but it is also more manageable, more direct, and when it has an incident, it is often better behaved. We wanted to know what a wing like the Ion3 light, which isn't designed to be used with a motor, would do when motorised.

The result: it is very responsive, almost a bit too twitchy, no doubt as a result of being loaded over its maximum all-up weight. But this 3 line EN B wing also has almost too much performance. Its behaviour is too 'paraglider' when motorised; it pitches substantially and, if the pilot applies too much power, it stays pitched far behind the pilot. For sure, using it with a motor is possible and perhaps even pleasant for a pilot who has been forewarned, but you don't really benefit from its light weight.

### SINGLE SKINS

In aero modelling, the manufacturers are offering more and more single skin wings. The main reason for this move is that a single skin, having an increased surface, is a lot slower. Therefore it's a lot nicer for a model aircraft pilot.

As a reminder: the first single skin paragliders appeared with the BHL (Barretina Hyper Lite), the Adrenaline Batlite and, of course, the Ozone XXLite. The advantage of such a simple surface compared to a 'real' paraglider is that it inflates almost on its own. It's logical because there is nothing to inflate; it's just a simple surface which comes up above the pilot like a rocket. Ideal for take offs without wind on a paramotor, one would presume.

## A MOUNTAIN WING WITH A MOTOR?

The Nova Ion 3 light wing is well suited to hike and fly. It's a lighter wing which is often slightly more responsive and nervous, but equally, gentler during incidents in flight – see also our comparison between the Trekking Senso and the Trekking Senso Sport in an earlier edition of free.aero.

We tried the Ion 3 light with a motor, even though it was neither specially adapted nor was it certified for doing this.

The result: used heavily loaded with the motor, it was a bit twitchy, perhaps slightly too much…


Amongst the manufacturers of model paragliders and paramotors there is a new trend: Using big single surfaces, slower and more clement than wings with cells. Above: The new Flair from Hacker. With 2.4 m2, it is very forgiving, but is also good for acro manoeuvres (SATs, helicopters, power loops).
The full kit (including motor, batteries, remote control…) 839 euros
http://www.hacker-motor.com

# A SINGLE SKIN WITH A MOTOR.

And so the specialists in collapses like Cédric Nieddu from Certika confirm that these wings, at least the ones with a big area like the Batlite, can behave even better than the two surface lightweight wings.
Here's the explanation: In a classic wing, the large quantity of air trapped in the cells obviously weighs nothing in the air, but during dynamic movements, its inertia plays a role.
For example, when a classic paraglider dives forward, the inertia of the air mass in the cells amplifies the movement.

On the other hand, its inertia brakes the small movements that light turbulence causes to the wing.

Conversely, a wing with a single skin is a lot twitchier above the pilot. The slightest breath of air moves it like a leaf. It's even, combined with a low maximum speed, one of the main reasons why this type of wing hasn't become a standard hike and fly wing.

On the other hand, a Batlite barks worse than it bites: the little twitches generally remain small, the lack of inertia, as a rule, stops it diving far. When it collapses, it reopens instantly.

*(Continued on page 78)*


The Oxy 3.0 by Opale Paramodels is the latest in this family of mono surface wings to make its appearance.
With its 4 metre wingspan (the biggest radio controlled wing), it is incredibly realistic.
According to the manufacturer, this new wing will have the same wind penetration as a double surface wing.
It will be ideal for getting started as well as for doing acrobatics: dynamic stalls, Misty flips, Mac Twists, Inverse Helicopters, Power loops and Coconut sats.
Pack Oxy 3.0/Backpack L/Motorisation: 899 €
www.Opale-Paramodels.com

In paragliding, the single skins appeared a few years ago with the BHL (www.laboratoridenvol.com), the XXLite from Ozone and the Batlite from Adrenaline.

These are very light, easy to inflate wings, but their maximum speed is limited.

The Batlite (left and above), for example, has characteristic very good behaviour, even during collapses.

Photos: Véronique Burkhardt

Photo: Ozone

The XXLite from Ozone: This single skin only weighs 1.2 kg in size 16, a record for a paraglider that actually flies…
It isn't just designed for ploofs. In 2012, a pilot even landed on top of Mont Blanc in an XXLite. Nevertheless the circulation remains rather restricted compared to classic wings.
The main reason is the lack of speed. The Ultralite 3 from the same manufacturer only weighs about 2.2 kg, not much heavier, but offers a 'normal' range of speeds.

In paramotoring, we have tried to find the same ease of piloting as in the small scale models. The result has been rather mixed…
http://www.adrenaline.com.es

*(Continued from page 74)*

At the Coupe Icare 2011, Mathieu Rouannet tested one of the first XXLites with a motor and noticed the incredible ease with which it inflated, no matter what the conditions…

For this lightweight article and motivated by the success of the big mono surfaces in aero modelling, we tried to test a Batlite with a motor, well known for being better behaved than the smaller XXLite.

But unfortunately, at the moment, there is little interest in this domain. Obviously it is impossible to get the inflation wrong. But the very low maximum speed, barely reaching around 37km/h, means that you are already bound to have too much wind as soon as there is the slightest breeze. But also, the twitchiness is completely alien, used as we are to modern reflex profiles, which cut through the air and the turbulence as if there was nothing there.
The single skin is quite the opposite. It shakes, twists, rolls and pitches. Certainly very small, but not really very comfortable as soon as the air becomes the slightest bit turbulent.

Another equally surprising phenomenon unique to the Batlite, whether free flying or with a motor, but not present with the XXLite; it pumps along the chord at maximum speed. Making rhythmic movements, it plays the accordion along the chord line.

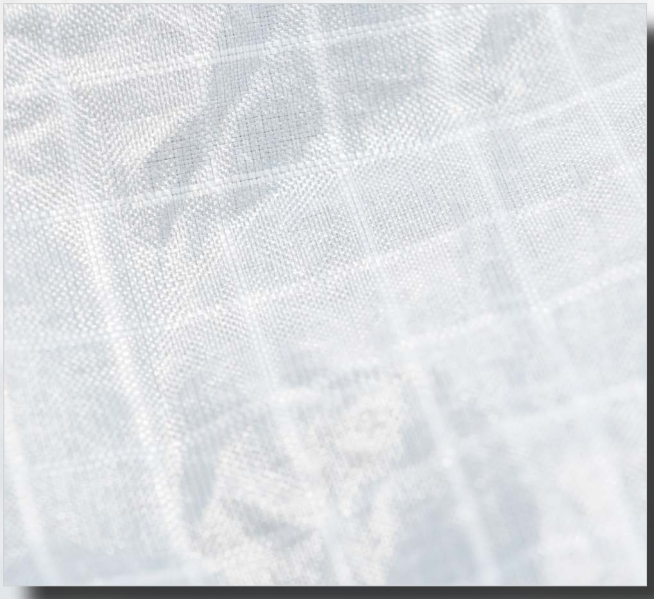
It's similar to what happened along the wingspans of the first paragliders with ten cells but, here, it's between the leading and the training edge, which alternately come together then more apart.
A possible explanation: The Batlite is a little restrained by the brakes, even with hands up. It's not bad, but from a comfort point of view…

In short, a single skin paraglider is fun to take off with when there is no wind, and you can even play with it in these conditions, but as soon as there is wind or turbulence, it's less amusing. So it's best to leave the single skins to the aero modelists: they can really take advantage of their gentle behaviour during collapses, but don't feel the micro movements through their harnesses, unlike us… ■

This short video shows the oscillations when flying with hands up (after 00:44).
www.free.aero/videos/batlite_ppg


The inflation and take off with the Batlite is disconcertingly easy. But in the air, the wing moves and works a lot, and the maximum speed is too limited.


Most ultralight wings use Skytex 27 as the principal fabric. It was developed by Porcher in collaboration with Nervures. It is easy to recognise as the squares appear to be larger than on the manufacturer's other fabrics.



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